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Railway Mechanical Engineer

March
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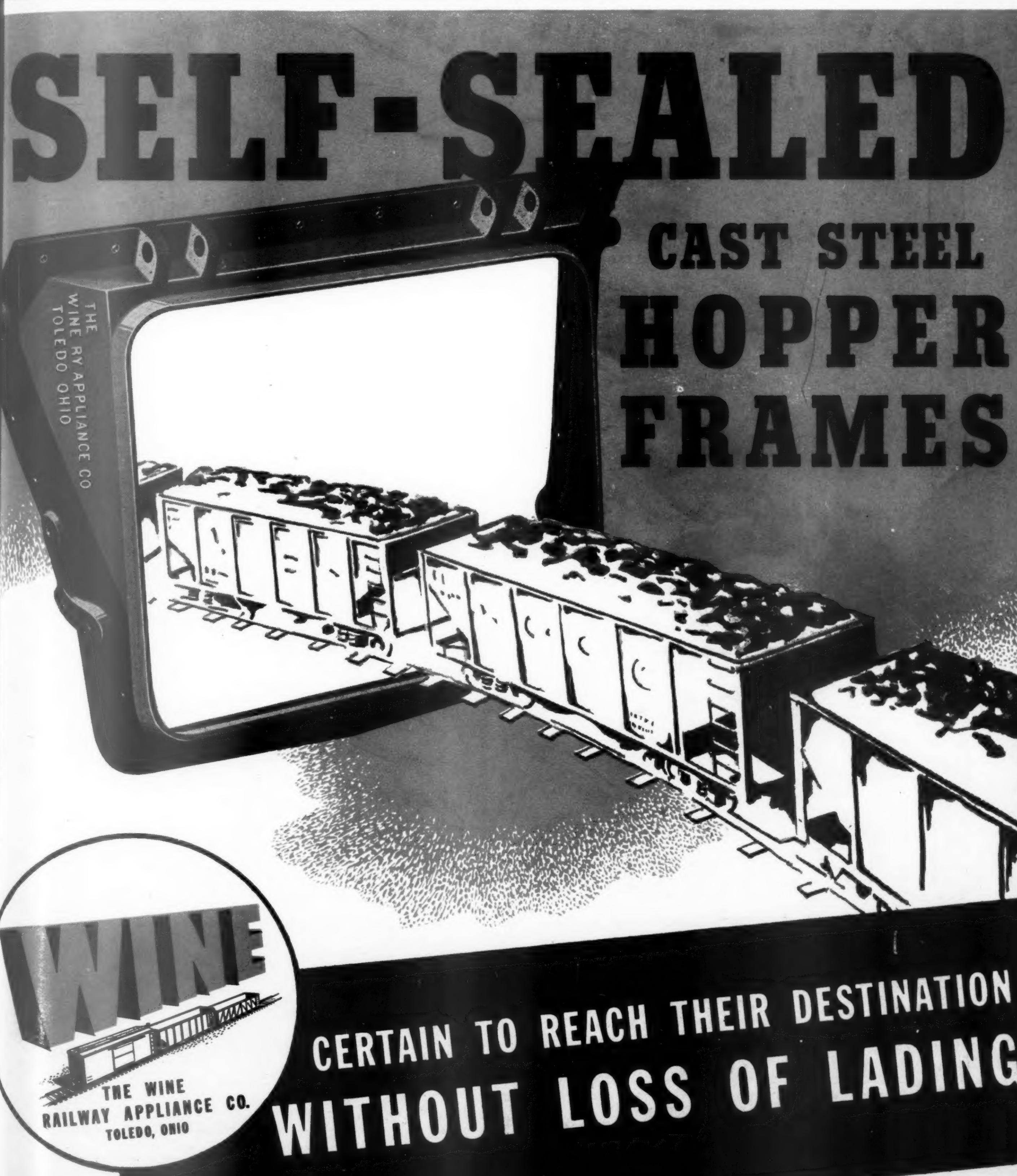

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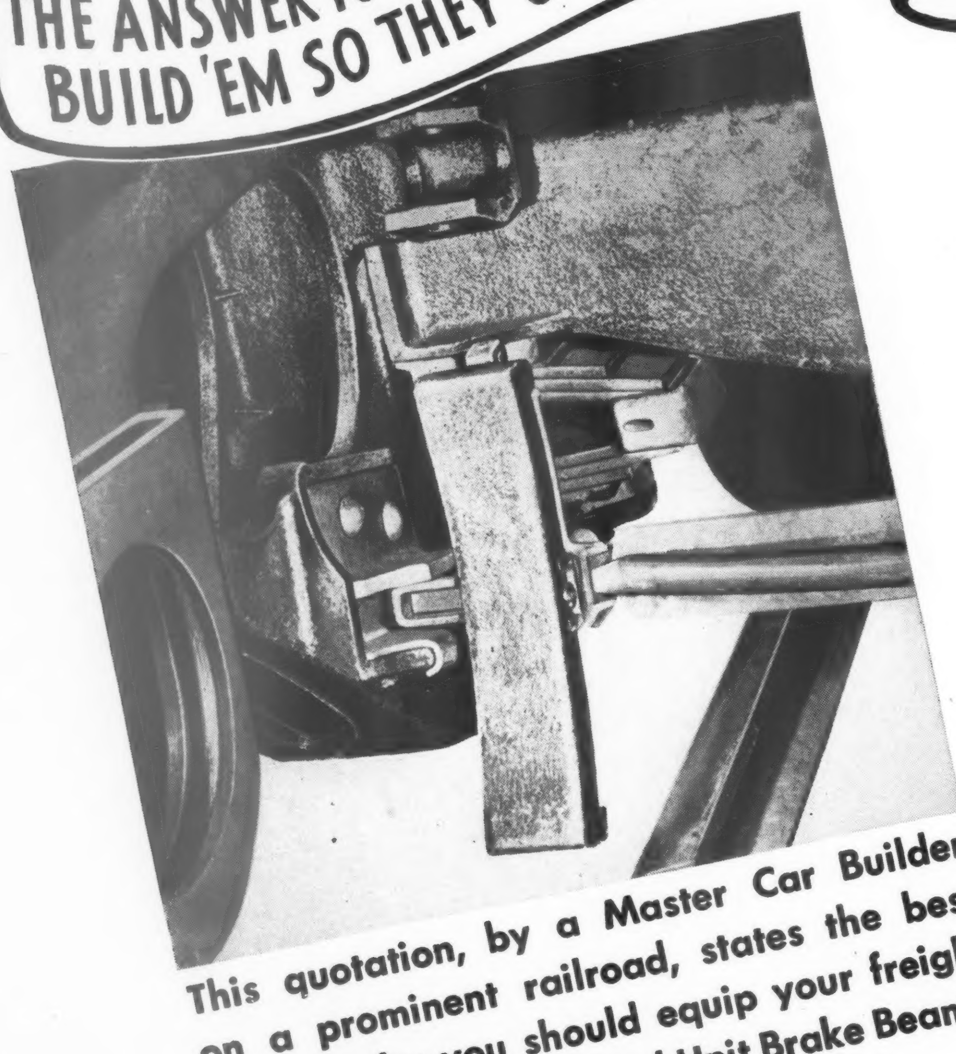

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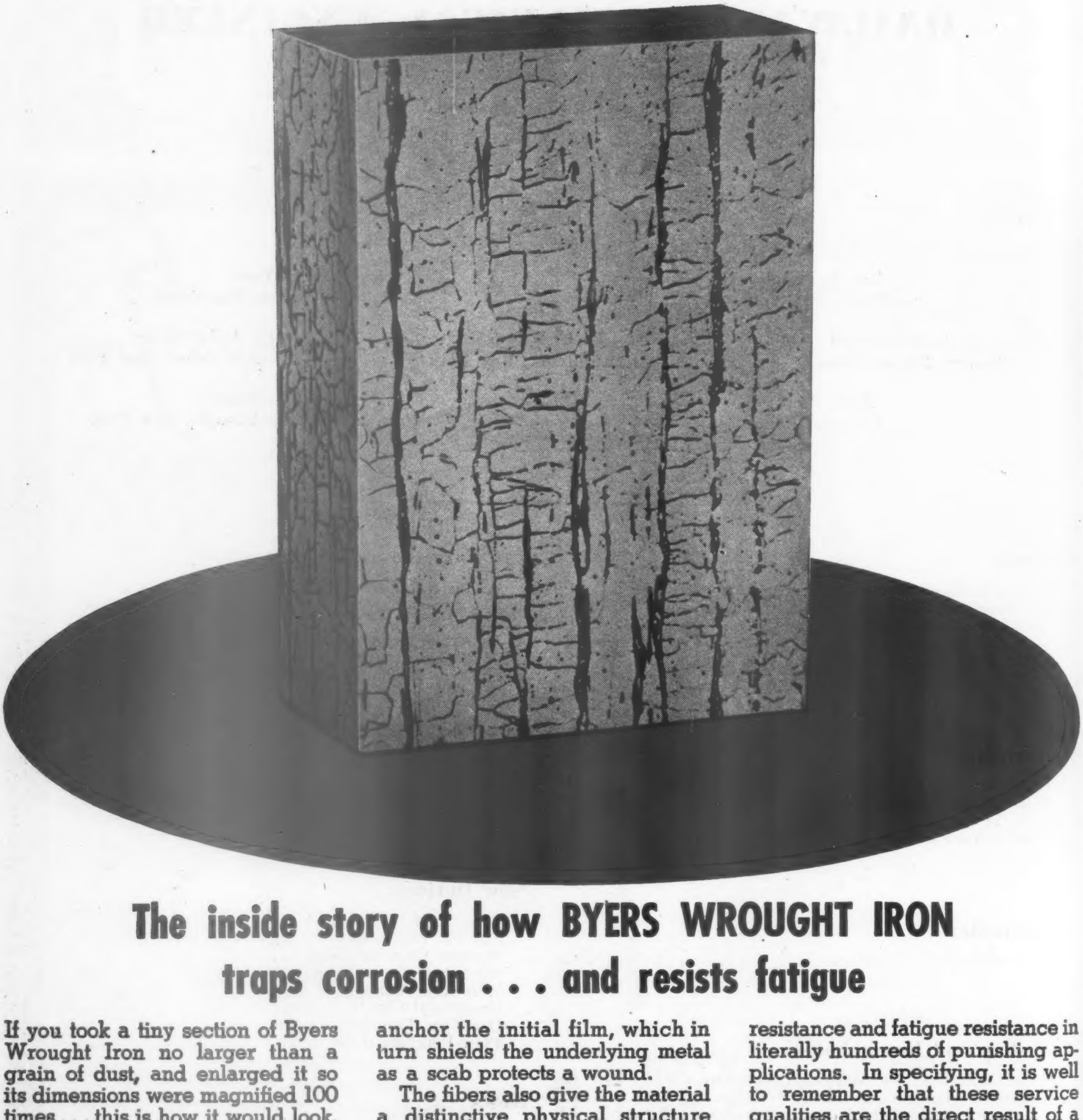

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Fig. 1—Inbound inspection track and inspection sheds

Norfolk & Western

Terminal Capacity Increased*

By C. E. Pond†

Outside servicing buildings at Shaffers Crossing enginehouse reduce congestion over turntable and in the house

THE extensive improvements and expansion of yards and locomotive terminal facilities of the Norfolk & Western at Roanoke, Va., which were started in the fall of 1940 and completed in the summer of 1943, have made possible greater speed and efficiency in handling vital war traffic.

The Shaffers Crossing terminal at Roanoke is the principal engine terminal and servicing facility on the railroad. Built in 1918, it consisted of a single 40-stall enginehouse. The house and outside facilities were planned for servicing and handling a maximum of 80 locomotives per day. The coaling and watering capacity was in excess of this. Early in the current emergency the number of locomotives that had to be handled frequently exceeded by 50 per cent the number for which the terminal was designed and it became necessary to increase the handling capacity to 135 engines or more each 24 hours.

* A paper presented at the Joint Session of the Railroad Division and Oil & Gas Power Division of the American Society of Mechanical Engineers, and the Transportation Committee of the A. I. E. E., at the Annual Meeting, November 29-December 3, 1943, New York.
† Assistant to superintendent motive power, Norfolk & Western.

This was done by re-arranging and increasing some of the outside facilities without any addition to the basic facilities such as the number of stalls, turntable, coaling station or locomotive water supply beyond the lengthening of some stalls, improvement of enginehouse floor and drop pits, and the re-arrangement of some outside standpipes. The work was handled during a period of record volume of traffic, and without any interruption to the handling of that traffic.

The plan was worked out for an "assembly belt" layout so that an incoming locomotive, as it proceeded down the line, would get progressively the various services needed to prepare it for the next trip and would, in the shortest possible time and without making any back movements, come off the end of the line completely serviced, turned if necessary, and ready for its next trip.

The major improvements made were in trackage, ash hoist additions and relocations, incoming inspection pits, engine washing platform and standpipes, enclosed inspection and lubrication buildings, a 35-ft. extension to 16 stalls, and the construction of adequate wash and

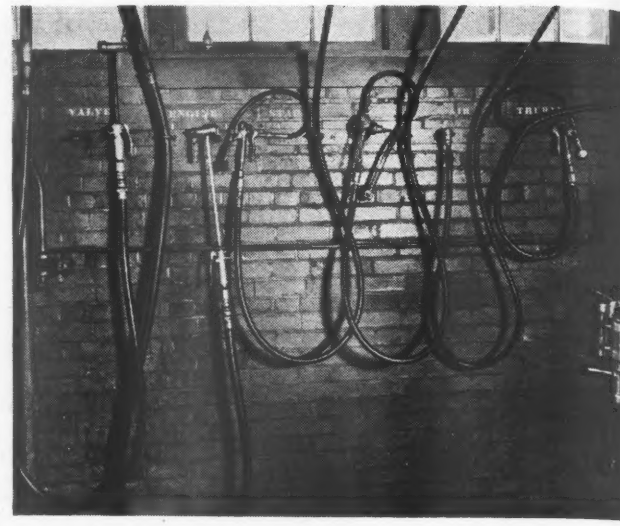


Fig. 3—Various hose and fittings used for lubrication

Fig. 2—Interior of one of the engine inspection buildings showing arrangement of inspection pits and lubrication connections at several locations

locker rooms for the accommodation of all engine and roundhouse employees.

With 16 stalls of the enginehouse utilized for periodic tests, inspections and attendant repairs, and 13 stalls used for wheel dropping, flue renewals and other heavy repairs, there remained only 11 stalls for running repairs. The spotting and movement of these shopped locomotives frequently tied up the turntable. With these interruptions to the turntable, and the limited stall room, 135 locomotives could not be put over the turntable into the enginehouse and a like number moved out of the house over the turntable. To get the capacity without an additional turntable and enginehouse, it was decided to build covered inspection buildings where locomotives could be inspected, lubricated, and light repairs made for a quick turn-around. For instance, if a locomotive was received from either the Bristol, Va., or Bluefield, W. Va., districts, it could be serviced without turning and despatched east to Crewe, Va., north to Hagerstown, Md., or south to Winston-Salem, N. C. Locomotives received from Crewe, Hagerstown or Winston-Salem could be serviced

(*Continued on page 116*)

Fig. 4—Terminal employees servicing an articulated locomotive

The Requirements of

Good Railroad Supervision*

By C. M. House†

Inspired leadership, as well as good judgment, common sense, fairness, receptivity to new ideas and knowledge of the work at hand are essential requirements

The critical shortage of materials and manpower has resulted in a large gap between supply and demand in transportation. Therefore, the supervisor plays a distinct and prominent part in helping to reduce this gap. We on the Alton, and I don't doubt but what you are experiencing the same predicament on your railroad, are far short of filling our quota of authorized forces despite efforts to promote helpers and apprentices to mechanics and employing of female help in certain branches of the mechanical department. But the supervisor out on the firing line, who is face to face with these abnormal conditions, views them with calm reality and makes the best of it; interesting himself to the nth degree, he can and will by his own ingenuity and resourcefulness overcome obstacles that would retard the efficiency of his particular department and thus continue the smooth-running machinery of the railroad.

Shortcomings of Railroad Supervision

However, in my experience with supervision I have observed various shortcomings of so-called qualified supervisors in their dealings with employees. Most of us are altogether too prone to take men for granted. There are certain fundamental truths concerning the actions and reactions of men just as there are similar fundamentals upon which scientific thoughts are based. In our study of men we do not always get the same reaction in every experiment as we do from some other subject. However, if you will observe human nature you will note the human impulses, the human desires and the human reactions which will give you a fairly conclusive idea of the elements of the man problem and just what reactions may be expected from any method of handling a group of men. I have found that the first step in a study of the man problem is a study of those things which affect men's thoughts and actions.

Man by nature, I believe, has the inherent desire to discharge his duties to the best of his ability. His responsibility and ambitions arising out of family and social obligations make him conscious of this requirement. He wants to do the right thing. He realizes that by properly carrying out his assignment will help him to achieve his ambitions and fulfill his responsibilities. But it has been my disappointment to observe that because an employee was responsible for some minor irregularity his actions henceforth were viewed with open suspicion. The supervisor in assuming under these circumstances that an attempt is being made to undermine the morale and efficiency of the department is not only unfair to the individual involved but to himself as well. In such cases the employee should be given latitude in order to restore his confidence.

The supervising officer who is thoroughly practical and understands the technicalities of his work perfectly, but lacks one knack of handling men, has a serious problem on his hand. For example, the tactless foreman prides himself on treating all men alike, but he might just as logically take pride in applying the same heat-treatment to all kinds of steel. Men differ in analysis more widely than steels. Ordinarily steels may be successfully heat-treated when the relative contents of a few elements—such as carbon, manganese, etc., are known; and so a knowledge of a relatively few elements in human nature makes it possible to deal successfully with problems arising in shop management.

The Supervisor a Department Manager

In the past it was thought that all that a foreman needed was unusual skill in his trade, so that he would know better than anybody else how the work should be performed and be able to perform it himself, if necessary; but in recent years, the functions of the supervisor have become much broader. The supervisor is virtually the manager of his department.

The fact cannot be escaped that one of the foreman's important duties is to be a fair and impartial representative of the shop management to the men in his department. He must also be equally fair and impartial in representing the men to the management. In plants where the men ask for shop committees, the foremen are generally one-sided representatives. If they represented the interests of their subordinates fairly before the executives of the company, no need for special committees would be felt.

The foreman or supervisor should adjust all matters over which he has authority as quickly and as fairly as possible. He can help himself a great deal by first trying to find out who or what hurt their feelings. When conditions arise that he cannot adjust himself, he should not delay in presenting the matter to a higher executive.

Many foremen seem to think that tact and diplomacy are not consistent with honesty and frankness. I believe you will agree with me that in this view they are mistaken. No useful purpose can be served by arousing a man's resentment in pointing out an error to him, if the same error can be brought to his attention without sacrificing his good will. The difference between diplomacy and tactlessness in handling men is the difference between "leading" and "driving."

---

* Paper presented at the November 16 meeting of the Car Department Association of St. Louis, at which Mr. House was the honor speaker and received the 1943 bronze plaque award of the association, inscribed as follows: "Presented to C. M. House, superintendent motive power and equipment, The Alton Railroad, November 16, 1943, a gentleman and craftsman whose exemplary devotion to duty and the railroad industry invites emulation. Car Department Association of St. Louis."

† Superintendent of motive power and equipment, Alton, Chicago.

Some supervisors have no difficulty in getting their men to adopt new methods, while others meet with stubborn resistance. This is because the successful foreman uses proper "selling" methods in introducing new ideas; he may even go so far as to make it appear to the shop men that they were really the originators of the idea. The second type of foreman tries to force the acceptance of new methods on the strength of his authority—the result usually being friction, accompanied by reduced production, higher costs, and lower efficiency.

You probably ask yourself, "How shall I make men like me"? The biggest part of the answer is simple, "By liking your men." Admiration, respect, loyalty, cannot be one-sided. Experience has taught me that the more you give of them, the more you will receive. Mutual liking leads to mutual understanding and on this foundation you can build up a strong and dependable department. At the same time you will build for yourself a real reputation as a supervisor. Remember, too, that the supervisor who has the genuine respect and admiration of his men, invariably stands high in the estimation of his superior officers. Your men constitute an interesting field of study, and in order to lead and direct men successfully a supervisor should study their attitude of mind—their point of view—what interests them, and makes them responsive to fair and intelligent leadership.

Every employee, being human, likes to know that he will be accorded an opportunity either for promotion, self-expression or appreciation, because every man has a right to high ambitions and every worker should be made to realize that demonstrated ability to assume greater responsibility will be recognized. There is an old saying, "Many a man would rather that you heard his story than that you granted his request."

There are very many cases where a man's work gives greater opportunity for self-expression than is offered through any other outlet. If a man has initiative, ingenuity, mechanical skill, or any other attribute, he is only human to wish opportunity to demonstrate his particular ability or skill so that it may be known and appreciated. In many cases a man is just taken for granted in his home, consequently a word of appreciation from his boss for work well done is doubly treasured. Again, the job itself may form such an important background to the home life that a man who is not happy in his work finds it almost impossible to be happy in his home.

Show Employees the Importance of Their Work

One of the most important elements which determine the satisfaction a man receives from his work is faith in the hope that what he does is of some importance. Every man who has a right to be on the payroll is there because of the necessity for accomplishment of the particular job to which he is assigned. In an industry as large as a railroad it frequently pays a supervisor to tell an individual workman the need for or the results accomplished by his particular job assignment. In this day of specialization, it becomes more and more important that plans be worked out whereby every workman will understand the purpose of the work he is doing.

You have probably noticed that it requires a higher degree of intelligence and understanding for the supervisor to properly handle the human side of his problem than to handle either the business or mechanical side. Changing conditions present changing aspects of any problem and this is particularly true of the man problem on the railroads today.

Look back a few years to the time when the "Safety First" slogan first gained prominence in railroad circles. There was the desire on the part of management to prevent accidents and injuries to its employees and that desire was transmitted through the organization; however, little progress was made until a comprehensive plan for working out that desire in practical manner, was evolved and put into effect. Real results along the line of Safety First were not accomplished until each individual supervisor was definitely charged with the responsibility for the safety of his particular group of employees.

Railroad employees are regular folks, just the same as any other group of people; they are more intelligent than the average, more self-reliant and they will respond more quickly to fair dealing, true fellowship, and the desire to serve, than any other class of employees in the country; but for these same reasons, they detect more quickly artificiality, selfish interest, and lack of sincerity, than do other groups of workers.

Doubtless many of you realize that it takes patience and courage on the part of the supervisor, no matter how sincere he may be, to gain the loyalty, fellowship and cooperation of his men. No employee can realize the employer's problems until he himself has been an employer. Many times an employee, when promoted to a foremanship, becomes so unreasonable in his attitude toward the group he has just left, as to fail utterly in his ability to handle the men either as individuals or collectively.

The Necessity for Patience and Persistence

On the other hand, the supervisor who has the patience and courage to gain the loyalty, fellowship and cooperation of his employees finds that team work takes the place of unit effort; that good fellowship drives out discontent; that ambition and love of work will change an inefficient organization into an efficient one. It is well worth the effort. Generally speaking, the more a man knows about his job and the better he understands its purpose, the better he likes it, and the fact should not be overlooked that no one can be enthusiastic about his work until that enthusiasm has been inspired by honest liking for whatever work is being done.

The good supervisor modernizes his thinking and constantly seeks new standards of safety, service and economy. He should educate himself in advance of his men to maintain his proper position as a leader. He must observe the rules he asks his men to observe. He must believe in the principles he asks his men to carry out; he must be competent to direct the jobs his men are required to do. I have observed that men are not inspired by proclamation alone. The mere issuance of bulletins, orders or propaganda, receives but an indifferent response from either supervisors or men. Real inspiration comes from active, intelligent instruction and example.

Briefly, let us look at the matter from the employee's point of view. Why should the average worker believe in the sincerity of his boss' plea for safety when foremen permit or demand unsafe practices? Why should a workman believe in a plea for the necessity for economy when shop planning is so poor that he wastes time waiting for material? Why should a mechanic believe the sincerity of a supervisor in asking for good workmanship when it is impossible for him to obtain proper working equipment? It is only natural therefore that every time there is inefficient supervision anywhere on a railroad the workers who see such inefficiency on the part

of supervision resent any criticism of their work. However, I believe it is generally understood that management, by its policies and through the training of its supervisors has been, and is removing the excuses that present themselves to the minds of employees as justification for inefficiency or the withholding of their best efforts. Until this is done, however, inefficiency will continue.

Grievances, Agreements and Fair Treatment

Just a word now about grievances, agreements, etc., the necessity for fair treatment of workers is a proved and accepted policy of present-day railroading. Millions of dollars have been lost in industry in the past because of failure to recognize this policy, because when a man has a real or fancied grievance against his boss the company pays the bill. The worker with the grievance, finding himself unable to retaliate on the boss, endeavors to salve his wounded pride by getting even with the company. There is no use spending time arguing about why this is so, because you and I know the fact remains the company pays the bill in reduced efficiency.

The fundamental consideration which should be understood by the supervisor is that railroads have agreements with many classes of employees as to wages, hours of service and working conditions. The first problem is a thorough study and understanding of the working agreements in effect, as well as rulings which have been made on any controversies that have arisen over the interpretation of the agreements.

It has been my experience in dealing with the labor question that the officers of the federated shop crafts know these rules by heart. They have lived with them through various changes and developments up to their present status. They have thought about the interpretation of each clause, as grievances and misunderstandings have arisen, and are practically letter perfect in their knowledge of just what the agreement means and what the rights of employees are.

In the same manner, we who have sat around the table when the agreements were developed and adopted are familiar with the spirit as well as the letter of the law contained therein. However, a local supervisor and the group of men under him may neither of them be as familiar with, or as expert in their understanding of, an agreement as those who made it. Unless the supervising officer makes it his business to study them, he may misinterpret or misapply some condition or clause with the result that a grievance will arise for settlement.

With the broader understanding of the human side of a railroad, and with the finer appreciation of the rights of the employees, there is a very general desire on the part of management to interpret any agreement on a broad and friendly basis and to live up to the spirit of the agreement, rather than to act on some technicality which someone may be able to read into the formal wording of the document. The wise supervisor is careful in making a "paper showing" of a few dollars here or there because of taking advantage of some technicality, because the spirit of antagonism created in the minds and hearts of employees under his jurisdiction by his one-sided interpretation of every case, produces a spirit of unrest and disloyalty, and puts his men on the defensive to take advantage of him. For every dollar he saves by his technic, ten times that amount is lost through decreased efficiency and actual waste. He breeds disloyalty in the organization, not intentionally, it is true, but the fact remains that employees, in their efforts to get even with a man of this kind, are likely to do things that are detrimental to the interest of the railroad.

Technicalities Versus the Spirit of the Rules

There is an old saying that "like breeds like," and the supervisor who reads into the schedule technicalities that were not intended, creates a similar spirit of technicality among the men under him. On the other hand, a spirit of fairness, a spirit of willingness to hear the other fellow's argument, to follow the intent rather than the technicality of the agreement, engenders a like willingness on the part of the men to interpret the rules fairly and broadly.

You will recall how Shakespeare in his Merchant of Venice showed the attempt to insist on the contract for a pound of flesh re-acted upon the claimant so that he lost all. The supervisor or the employee who insists on his "pound of flesh" on every decision may find that advantage is being taken of him on every possible occasion, as retribution for his stern and unyielding point of view.

I do not infer that the supervisor should not be firm in his decision, that he should not decide fairly with good judgment. I merely mean that the supervisor should not make the mistake of trying to read into the agreement a stern, harsh, and unfair motive where, as a matter of fact, the agreement was a friendly decision as to what should govern in the case presented for claim.

A supervisor who is fair must do more than be fair. He must educate his organization to an understanding of what fair dealing really means and to an appreciation of the advantage of dealing squarely with a supervisor who deals squarely with his men. It is not enough that he be a just judge, he must be a friend, a councilor or a stern disciplinarian, as the case may require.

No one supervisor knows everything and we are all prone to make mistakes. It is wise, however, to seek advice frequently and listen to suggestions, and it is no disgrace to admit that one has made a mistake or may be wrong about something. The supervisor who tries to give his men the impression that he is the supreme boss, that they cannot tell him anything, who will never admit the possibility of his making a mistake, creates in the minds of his men, as you can see, a spirit to do simply what they are told to do with little or no idea than that of performing a minimum of work and keeping out of trouble.

The fact that the boss has confidence in them, that the boss is willing to listen to their suggestions even if he does not act upon them, that he is treating them as intelligent, loyal co-workers, creates a spirit of desire to do work well whether they are working under direct supervision or working by themselves, away from direct supervision. If the supervisor has the right attitude of mind toward his work, his natural attitude will be one of patience, understanding, willingness to teach and joy in the job that will be indicated by a smile, an even temper, and a pleasant word. Even if the foreman may not feel like smiling, it is his business to smile. Even if circumstances would almost seem to justify him in losing his temper, he should control himself.

Need for Constant Change and Improvement

Present-day conditions impose one comparatively new requirement on supervisors, namely, inspirational leadership. In a period of constant change and betterment, new ideas are being advanced continually by management. These ideas languish and die unless individual supervisors, right down the line, have that quality of inspirational leadership that enables them to enthuse their men with an idea.

It is, therefore, important that management recognize

(Continued on page 116)

Baltimore & Ohio Studies

Mechanical Improvements

All rods from a locomotive can be accommodated on this special carrier for movement around the shop

Cooperative plan encourages suggestions from employees—Widest possible application made of improved methods by central office control of all shop standards for the system

THE value of suggestions made by employees has been more generally recognized during these war years than ever before in our industrial history. The railroads, many of which formerly had no organized programs for encouraging such suggestions, are finding, along with other industries, that the men on the job often have much to contribute beyond the particular skill for the exercise of which they are paid. Efforts have been made and are still being made to increase further the participation of personnel in directing attention to ways and means of increasing efficiency and output, particularly in the mechanical department.

The cooperative plan of employee-management relations on the Baltimore & Ohio has been discussed frequently in the light of its value in promoting understanding between the two groups and in encouraging a family-like approach to problems. Over the years, since the initiation of cooperative meetings in the mechanical department on a system-wide basis, approximately 35,000 suggestions of all types have been made. The functioning of the plan provides for a thorough delving into the merits of and possibilities for employment of all suggestions submitted. Such studies are made by representatives of the management and the employees at regularly scheduled committee meetings, both local and regional. Throughout the 20-year history of cooperative attention to matters affecting men and management on the Baltimore & Ohio, these committees have considered many suggestions which related directly to problems involving shop efficiency and output. Apart from those which are concerned with general welfare, health, safety, comfort or convenience around shop points, there are many suggestions dealing with jigs, fixtures, procedural changes, shop layouts, material handling and routing, and the need for new hand tools, machine tools and shop equipment.

All of such proposals are considered on their merits at cooperative meetings and, the history of the mechanical department shows, the great majority of them are adopted and placed in effect in complete or modified form. The war has not changed this nor has the road put on any special campaigns to elicit suggestions from employees. It has not because there has been no need to encourage what has become a natural part of the attitude which shop employees have toward their work. Even the average monthly number of suggestions has remained fairly constant during the war, indicating, it seems, that thoughtful consideration of possible improvements, when always encouraged, is relatively unaffected by upswings in shop demands. One mechanical officer stated that, in his opinion, there had been no sudden increase in the number of suggestions because the cumulative effect of 20 years' operation of the suggestion plan had considerably reduced the possible number of suggestions which might otherwise have been made. The same officer, however, pointed out that efforts were being exerted to increase the value of suggestions made by extending their use on the system.

How Widely Can Suggestions Be Applied?

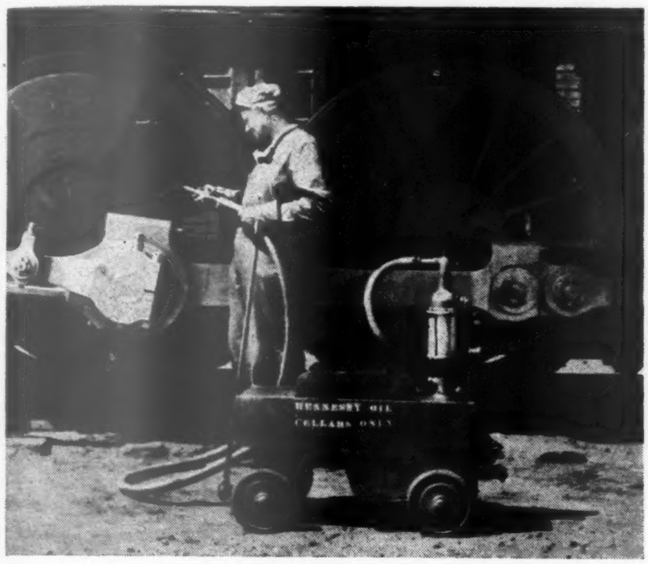
Within the last several years, suggestions relating to increased efficiency in the repair and maintenance of equipment which might formerly have had only local

An elevating device developed for use in applying box car doors

adoption at the point of origin or, perhaps, have been passed along to a few other shops, are now studied to determine whether they shall be adopted as system standards. These are usually suggestions which involve jigs, fixtures and other home-made improvements. The new

procedure does not affect the operation of the cooperative plan which goes on as before. It does, however, result in increased utilization of improvements inaugurated through the action of the cooperative committees in addition to those developed independently of committee action. It is having an important effect upon the standardization of procedures and the volume and quality of output at the various shops on the system.

A selective screening process in the study of all suggested changes provides for the channeling of the best



Special cart employed at engine terminals for filling oil cellars on Hennessy lubricators

through to the attention of the highest ranking officers of the mechanical department. The general superintendent of motive power and equipment and his assistants pass finally on all suggestions which reach them after they have undergone the critical study of subordinate officers starting with supervisors at the points where the suggestions originate. Ideas thought worthy of adoption will have been checked over by foremen and general foremen, shop superintendents or master mechanics, and regional superintendents of motive power or master car builders before the office of the system supervisor of shops completes their study. This screening method is intended to reduce the number of suggestions reaching the attention of system officers only to the extent that it eliminates those which are not practical.

Telling the Story

A form has been provided for use in reporting results obtained by the adoption of a suggestion at the originating point. It calls for the submission of information concerning the nature of the device, the originator of the idea, the location where the device is used, and a description of old and new methods. When it is possible to furnish them, photographs of both old and new methods are submitted with the report form. These forms are transmitted to the office of the system supervisor of shops where they are studied carefully to learn whether they violate any rules of practice and whether they are actually an improvement in methods already prescribed for shop use. Occasionally it happens that enthusiasm for something different carries a suggestion along even where existing practice is demonstrably better. In such cases the "improvement" is not adopted as a standard.

After a complete study proves that a suggested improvement is definitely meritorious and should be adopted, it is again reviewed to determine how wide an application it shall be given. This selective system of application is based on a number of factors such as cost, volume of work, nature of shop layouts and availability of facilities of equal productive value. Some ideas, especially those which deal with changes in practice which do not involve extensive changes of facilities or expense, are made standard for all shops where they can be employed. Others are limited in application to those points where they are likely to prove of greatest value. Still others, particularly those involving new equipment or machine tools may lead to a series of changes. A selective study is made of all points where the nature and volume of work indicate the need for new installations. Only those points where the outlay is fully justified will be chosen; amortization of expenditures through savings is an important feature but other factors are also considered and may be controlling. Such new equipment programs often involve a series of changes with the older replaced equipment being sent to various other points on the road.

Shop Kinks

Inasmuch as it is a primary duty of the higher mechanical-department officers to be familiar with the needs for expensive new equipment and tool installations, this feature of the plan, while suggestions are not discouraged, is not so important as the careful consideration of proposals made in the shop-kink category resulting from the thoughtful ingenuity of men in the shops. To encourage this, local supervisors are allowed a considerable

(*Continued on page 112*)

THE BALTIMORE AND OHIO RAILROAD COMPANY

Motive Power Department

Title of suggestion — ____________________

Back Shop - Roundhouse
Car Yard (Pass. or Freight) — ____________________

Location in Sub-shop — ____________________

Suggested by - Supervisor — __________ __________
Workman — __________ __________
Name Date

Occupation — __________

Operated by — __________ __________
Name Occupation

Date Installed — __________

Built by — __________ __________
Name Occupation

Description — ____________________

Case History: Describe briefly the old method comparing it with the new method. Photographs of old method should be forwarded if possible with at least two different views of improved method showing operators in action.

If it develops that suggestion was made by supervisor only furnish name of mechanic and helper who first tried same out or who are working the development.

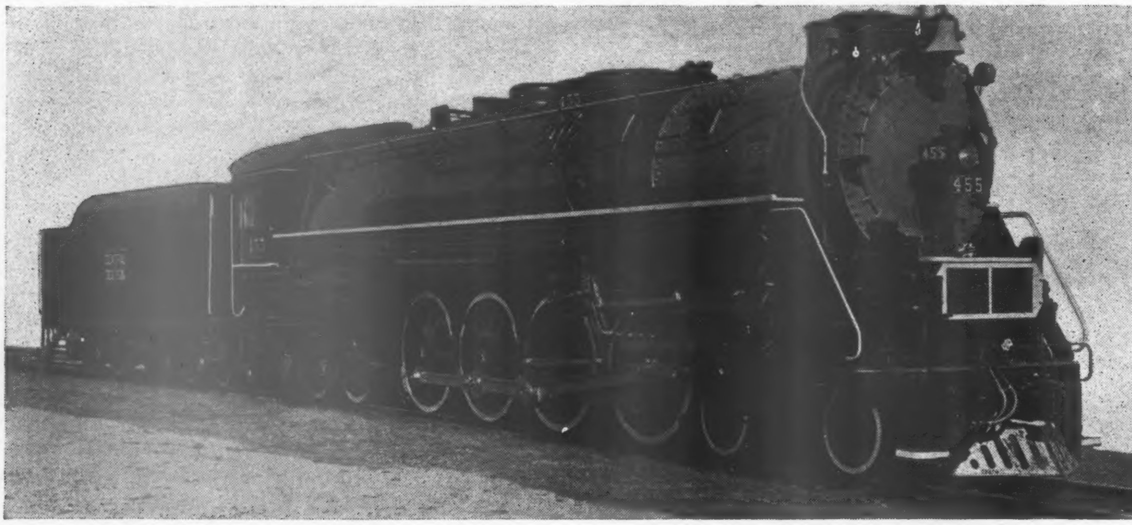
Photographs to be in triplicate of each view - old and new method.

Date __________ __________
Supt. Shops or Master Mechanic

Form used in reporting the development of shop kinks which are improvements upon methods formerly employed

Central of Georgia Installs Eight

4-8-4 Type Locomotives



Combination freight and passenger units built by Lima are designed, with 73½-in. wheels, for high-speed service—Have 63,200 lb. tractive force and weigh 260,000 lb. on drivers

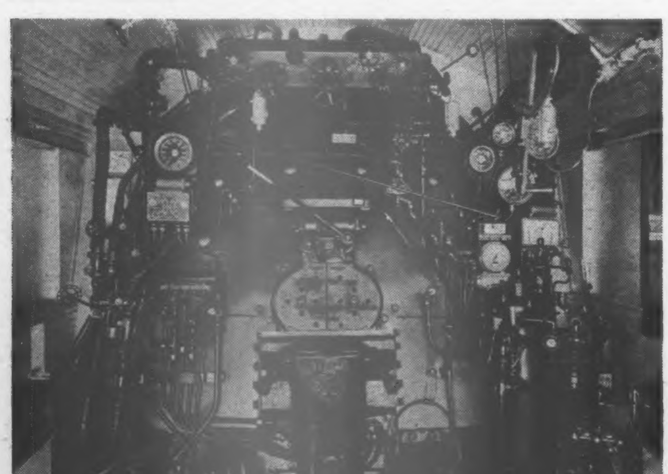
THE Central of Georgia, in October, 1943, received eight 4-8-4 type locomotives from Lima Locomotive Works, Inc., that will be used to handle fast passenger and freight trains over the heavy-grade territory of the Macon and Columbus divisions. In freight service their fuel performance is well under 100 lb. of coal per 1,000 gross ton-miles and they average 11.4 lb. per passenger-train car-mile in passenger service. These locomotives have a tractive force of 63,000 lb. and weigh 447,200 lb.

The locomotives have a General Steel Castings Corporation cast-steel bed. The engine truck is the four-wheel inside-bearing swing-motion type, having 30 per cent initial and 15 per cent constant resistance at the rockers. The center pin is cast integral with the bed casting. The trailer truck is the four-wheeled Delta type designed for 15 per cent initial and 10 per cent constant resistance at the rockers. The frame is arranged for double coil springs at the rear of the truck equalizer system. Both the engine and the trailer trucks were furnished by the General Steel Castings Corporation.

The driving wheel centers are of General Steel Castings Corporation Boxpok type 66-in. in diameter with 73½-in. tires. There are no hub liners on the driving wheels, the face being machined smooth and rolled. The engine truck wheels are Standard 36 in., wrought steel, multiple-wear type having no hub liners and with the entire wheel heat-treated. The trailer truck wheels have cast-steel centers, 38 in. in diameter with 45½-in tires. There are no hub liners on the trailer truck wheels.

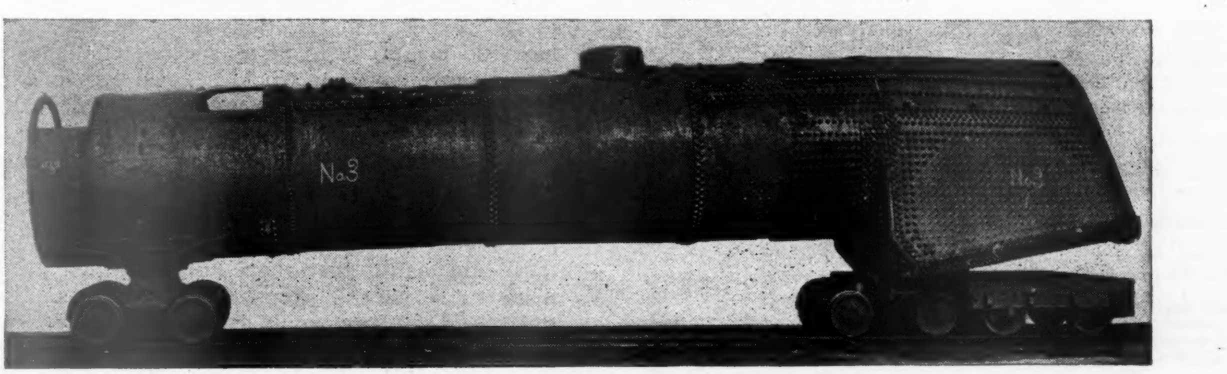
The valve gear is the Walschaerts type actuated by an Alco Type G power reverse gear. The exhaust of the gear is piped to lubricate the piston rod. The quadrant is blanked off so that the engine cannot be hooked up in forward gear less than 25 per cent cut off.

The main and side rods are of medium carbon steel, normalized and drawn. All are of I-section with Magnus bronze bushings. The main rod front end bearing is the one-piece type while the back end bearing is the solid type with floating bronze bushings in Hunt-Spiller gun iron shells. The side rods have Hunt-Spiller gun iron fixed bushings at the main and intermediate pin, the other bushings being the floating type. All floating bushings in the main and side rods have floating flanges of steel plates. All main and side rod and knuckle pin bearings are lubricated through the pins. The engine



General Dimensions, Weights and Proportions of the Central of Georgia 4-8-4 Type Locomotives

Builder	Lima Locomotive Works
Type of locomotive	4-8-4
Road class	K
Road numbers	451—458
Date built	October, 1943
Service	Fast freight and passenger
Dimensions:	
Height to top of stack, ft.-in,	15—10½
Height to center of boiler, ft.-in.	10—8
Width overall, in.	129¾
Cylinder centers, in.	93
Weights in working order, lb.:	
On drivers	260,000
On front truck	78,900
On trailing truck	108,300
Total engine	447,200
Tender (fully loaded)	246,640
Wheel bases, ft.-in.:	
Driving	20—0
Engine, total	45—10
Engine and tender, total	83—6
Wheels, diameter outside tires, in.:	
Driving	73½
Engine truck	36
Trailing truck	38
Engine:	
Cylinders, number, diameter and stroke, in..	(2) 27x30
Valve gear, type	Walschaerts
Valves, piston type, size, in.	12
Maximum valve travel, in.	7¼
Steam lap, in.	1¾
Exhaust clearance, in.	3/16
Lead, in.	¼
Cutoff in full gear, per cent	73.5
Boiler:	
Type	Conical
Steam pressure, lb.	250
Diameter, first ring, inside, in.	86
Diameter, largest, outside, in.	96
Boiler (cont'd):	
Firebox length, in.	127-1/16
Firebox width, in.	102¼
Combustion chamber length, in.	60-1/16
Arch tubes, number	two
Syphons, number	two
Tubes, number and diameter, in.	56-2¼
Flues, number and diameter, in.	159-4
Length over tube sheets, ft.-in.	21-6
Net gas area through tubes and flues, sq.-ft.	9.9
Fuel	Bituminous coal
Grate area, sq. ft.	90.2
Heating surfaces, sq, ft.:	
Firebox and comb. chamber	350
Arch tubes and syphons	85
Firebox, total	435
Tubes and flues	4,270
Evaporative, total	4,705
Superheater, type E	2,059
Tender:	
Style	Rectangular U
Water capacity, U. S. gal..	13,000
Coal capacity, tons	21
Trucks	Four-wheel
General data, estimated:	
Rated tractive force, engine, 85 per cent, lb.	63,200
Weight proportions:	
Weight on drivers ÷ weight engine, per cent	58.1
Weight on drivers ÷ tractive force	4.11
Weight of engine ÷ evaporation	95.0
Weight of engine ÷ comb. heat surface	66.1
Boiler proportions:	
Firebox heat. surface per cent comb. heat. surface	5.2
Tube-flue heat, surface per cent comb. heat. surface.	63.1
Superheater heating surface per cent comb. heat. surface.	30.4
Firebox heat. surface ÷ grate area	3.88
Tube-flue heat. surface ÷ grate area	47.34
Superheater heat. surface ÷ grate area	22.8
Comb. heat. surface ÷ grate area	75.0
Gas area, tubes-flues ÷ grate area	0.11
Evaporative heat. surface ÷ grate area	52.2
Tractive force ÷ grate area	700.7
Tractive force ÷ evaporative heat. surface	13.4
Tractive force ÷ comb. heat. surface	9.34
Tractive force × diameter drivers ÷ comb. heat. surface.	686.8



is equipped with multiple-bearing guides and crossheads, force-feed lubricated.

The driving boxes are of cast steel with Mangus bronze bearings. The hub faces are of Satco metal with brass inserts. The boxes are equipped with Franklin No. 8 cellars for grease journal lubrication. The Alco lateral cushioning device is used on the front drivers and allows $\frac{9}{16}$ in. total lateral.

The engine truck and trailer truck boxes are of cast steel with Magnus self-cooling oil-type bearings. The boxes are arranged for force-feed lubrication to waste packing.

The boiler is radial stayed, conical type, 86 in. outside diameter at the front and 96 in. outside diameter at the throat. The shell is of flange quality basic carbon steel. The horizontal seams are quintuple riveted butt joints with inside and outside welts and welded on both ends with a weld not considered in calculating seam strength. The girth seams of the barrel and throat are double riveted lap joint.

The firebox is equipped with two Locomotive Firebox Corporation's syphons as well as two arch tubes of 3½ in. diameter. Welded construction is used throughout the firebox. The inside throat sheet is welded in with the exception of the bottom edge which is riveted to the mud ring. No longitudinal welds are in the crown sheet above a point 15 in. below the top of the sheet and crown and side sheet seams are welded. The firedoor sheet is butt welded to the side and crown sheets and the back tube sheet is welded in.

These locomotives are equipped with a Type E superheater, the American multiple throttle with the Superheater Company's washout system for throttle and header and an Elesco feedwater heater.

The tenders of these locomotives are of the rectangular U type with four-wheel trucks and have a water capacity of 13,000 gals. with 21 tons of coal. The tender coal space is equipped with the Standard Stoker Company's coal pusher. The stoker engine is also located on the tender.

The operating brake is the New York Air Brake Company's No. 8-ET equipment with the brake on the driving wheels and tender only.

Partial List of Materials and Equipment on the Central of Georgia 4-8-4 Type Locomotives

Bed casting; engine and trailer truck	General Steel Castings Corp., Eddystone, Pa.
Engine truck wheels	Standard Steel Works Division of the Baldwin Locomotive Works, Eddystone, Pa.
Driving and trailer tires; springs	American Locomotive Co., Railway Steel Spring Div., New York.
Driving wheel centers	General Steel Castings Corp., Eddystone, Pa.
Hub faces	Magnus Metal Div., National Lead Co., New York.
Frame shoe and wedges	Hunt-Spiller Manufacturing Corporation, Boston, Mass.
Lateral cushioning device	American Locomotive Co., Railway Steel Spring Div., New York.
Coupler and pocket, engine; trailer box lids	National Malleable & Steel Castings Co., Cleveland, Ohio.
Radial buffer	Franklin Railway Supply Co., Inc., New York.
Foundation brake	American Brake Company, St. Louis, Mo.
Pilot	General Steel Castings, Corp., Eddystone, Pa.
Operating brake	New York Air Brake Co., Watertown, N. Y.
Cylinder cocks and operating valve	The Prime Mfg. Co., Milwaukee, Wis.
Piston rings	American Hammered Piston Ring Div., Koppers Company, Baltimore, Md.
Piston-rod packing; valve-stem packing	Paxton-Mitchell Co., Omaha, Neb.
Bushings; bearings; trailer-box cellars	Magnus Metal Div., National Lead Co., New York.
Cylinder and steam-chest bushings; rod bushings; valve packing rings	Hunt-Spiller Manufacturing Corporation, Boston, Mass.
Reverse gear	American Locomotive Co., New York.
Boiler tubes	Bundy Tubing Co., Detroit, Mich.
Water gauge and column	Edna Brass Mfg. Co., Cincinnati, Ohio.
Universal joints	Hancock Valve Div. of Manning Maxwell & Moore, Inc., Bridgeport, Conn.
Flexible joints	Barco Manufacturing Co., Chicago.
Rigid stays	(4) Ewald Iron Co., Louisville, Ky. (4) Ulster Iron Works, Dover, N. J.
Flexible stays	Flannery Bolt Co., Bridgeville, Pa.
Washout plugs	Huron Mfg. Co., Detroit, Mich.
Spring rigging and bushings	Ex-Cell-O Corporation, Detroit, Mich.
Spring washers	The National Lock Washer Co., Newark, N. J.
Driving-box lubricators	Franklin Railway Supply Co., Inc., New York.
Lubricators	Nathan Manufacturing Co., New York.
Flange oilers	Detroit Lubricator Co., Detroit, Mich.
Alemite fittings	The Prime Manufacturing Co., Milwaukee, Wis.
Oil and grease	National Refining Co., Seattle, Wash.
Syphons	Locomotive Firebox Co., Chicago.
Blower valves	Walworth Company, New York.
Miscellaneous cocks and valves	(4) Crane Company, Chicago. (4) Ohio Brass Co., Mansfield, Ohio.
Superheater; feedwater heater; throttle	The Superheater Company, New York.
Steam-heat equipment	Vapor Car Heating Co., Inc., Chicago.
Back-pressure gauge	Manning, Maxwell & Moore, Inc., Locomotive Equipment Division of., Bridgeport, Conn.
Boiler lagging	Johns-Manville Sales Corp., New York.
Injectors and checks; injector steam valve; feed-pipe strainers; low-water alarm	Nathan Manufacturing Co., New York.
Firedoor	Franklin Railway Supply Co., Inc., New York.
Firebrick	American Arch Co., Inc., New York.
Grates	Waugh Equipment Co., New York.
Ash pan	General Steel Castings Corp., Eddystone, Pa.
Coal sprinkler	Wm. Sellers & Co., Inc., Philadelphia, Pa.
Suction hose	Goodyear Tire & Rubber Co., Inc., Akron, Ohio.
Cab inspection-card frame; cab side ventilator; cab windshield wings; cab clear vision window; cab back curtain	The Prime Mfg. Co., Milwaukee, Wis.
Cab sash	O. M. Edwards, Inc., Syracuse, N. Y.
Safety valves; steam gauge; steam-heat gauge	Ashton Valve Co., Boston, Mass.
Speed recorder	Valve Pilot Corporation, New York.
Air whistle	Ohio Brass Co., Mansfield, Ohio.
Whistle operating valve	Viloco Railway Equipment Co., Chicago.
Bell ringer	Railway Service and Supply Corp., Indianapolis, Ind.
Sanders	T-Z Railway Equipment Co., Chicago.
Cab lamps; classification lamps; back-up lamps; headlight; generator	The Pyle-National Company, Chicago.
Electrical equipment	General Electric Company, Schenectady, N. Y. Graybar Electric Co., Inc., New York. The Okonite Company, Passaic, N. J. The Pyle-National Company, Chicago.
Steel pipe and pipe fittings	Crane Co., Chicago.
Wrought iron pipe	A. M. Byers Co., Pittsburgh, Pa.
Tender:	
Frame	General Steel Castings Corp., Eddystone, Pa.
Truck side frames	American Steel Foundries, Chicago.
Truck wheels	Standard Steel Works Division of the Baldwin Locomotive Works, Eddystone, Pa.
Coupler; coupler yoke	National Malleable & Steel Castings Co., Cleveland, Ohio.
Draft gear	W. H. Miner, Inc., Chicago.
Brake shoes	American Brake Shoe Company, New York.
Body brake; clasp brake	American Steel Foundries, Chicago.
Stoker; coal pusher	Standard Stoker Co., Inc., New York.
Journal boxes	National Malleable & Steel Castings Co., Cleveland, Ohio.
Tank valves	Crane Co., Chicago.

B. & O. Studies Mechanical Improvements

(*Continued from page 109*)

amount of latitude in trying out things which they believe will work. Labor and material expense involved in such experimental work is not criticized even though ideas do not prove to be as successful in practice as it was thought that they would be. Of course, experimentation, for its own sake, is not encouraged in these days of labor and material shortages.

The illustrations show a number of practices which have been adopted as a result of this system of studying proposals made after successful application had been achieved at one point. It is felt on the B. & O. that these and many others have fully justified the attempts made to review all shop kink suggestions. Formerly, the value of many would have been lost except to the working forces at the point where the devices were thought of and made; now, with a central office reviewing all successful practices, a system-wide benefit results from the selective adoption of the best standards.

Full credit is given to those responsible for working out each idea adopted and much interest and pride is displayed by workmen at shops which have made a contribution adopted as a standard. Publicity is given in the company's monthly magazine to both the individuals involved and the entire shop organization.

The over-all benefits to be derived from the functioning of the system cannot be calculated alone on a dollars and cents basis. As an outgrowth of the cooperative relations between employees and management it has a value in giving the widest possible effect to the interested study of the mechanical problems of the railroad; as a practical matter it has been important in helping the road through recent years of labor and material shortages. And, as A. K. Galloway, general superintendent of motive power and equipment, puts it, "It's just plain good sense."

Effect of the War on

Railway Car Development*

By E. D. Campbell†

New materials discussed—Future of the freight car

The publicity given to post-war developments will stand some scrutiny from a practical viewpoint as many wild statements are made and apparently accepted as facts. One of the most popular subjects is that of the kind of new materials available when our war effort no longer restricts their use. We hear and read many discussions and articles in newspapers and other publications on the probable use of plastics, magnesium, aluminum, stainless steel, alloys of steel and other basic metals and materials.

The Properties of Materials

The four materials most widely publicized are alloy steels, aluminum, magnesium and plastics. We are all more or less familiar with steel and its alloys, so probably a simple analysis of the characteristics of these materials compared with steel, may be used to form a foundation for the discussion. In this analysis I will exclude plastics because the other three can be used for strength carrying members whereas plastics cannot.

In weight we find that steel in pounds per cubic inch is .285, aluminum .101, magnesium .065. Thus steel is approximately 2.8 times as heavy as aluminum and 4.4 times as heavy as magnesium. This weight ratio is, of course, the appeal in any analysis of metals. In design, however, we must know the strength values of the materials.

In any strength analysis we are first interested in the material's yield point and its ultimate strength. A rough comparison of these values of the different materials, again compared to steel, is shown in the table.

Characteristics of Car Construction Materials

	Yield Point lb. per sq. in.	Ultimate Strength lb. per sq. in.
Carbon steel—1020	32,000	60,000
Alloy steel (USS Cor-ten)	50,000	70,000
(Republic Double Strength)	55,000- 70,000	70,000- 90,000
Aluminum alloy (17-ST)	37,000	60,000
Aluminum alloy (24-ST)	50,000	68,000
Magnesium alloy (Am-E-57)	26,000	37,000- 45,000
Stainless steel (18-8 C.R.)	50,000-150,000	100,000-180,000

In all the above materials the physical characteristics vary according to elements included and subsequent treatment given the material as you all know.

Another strength ratio vital in computing strength of car members, is that of the modulus of elasticity. In this characteristic we find that steel is 29,000,000 lb. per sq. in.; aluminum 10,300,000 lb. per sq. in.; magnesium 6,500,000 lb. per sq. in. In cold-rolling stainless steel the modulus of elasticity may be brought down to a low of 21,000,000 lb.

As E is one of the denominators in deflection formulae for beams it is readily noticeable that this value has a direct ratio to the amount of deflection of the beam or member under consideration. From this analysis of strength characteristics, which is only representative, it may be assumed that any one or all of these materials can be used in car construction. Probably I should state here that neither aluminum nor magnesium have any practicable value as structural members until the base metal is alloyed and heat treated, therefore the resultant physical characteristics are dependent on the kind of alloys used and heat treatment given.

However, other properties and costs enter the picture. The matter of ductility is a serious one in connection with some members of a car. I might also mention that some alloys tend to become brittle at extremely low temperatures. Probably the one given the most serious consideration by a prospective buyer of equipment is that of cost. Here again we can become oriented as to the comparison of costs by using carbon steel as a base. At present, plates and shapes of carbon steel are $2.10 cwt. base, Pittsburgh, or a base of 2.1 cents per lb. Alloys of steel vary in cost, of course, as to the kind of alloys used. Probably the least expensive is USS Cor-ten. This alloy at present costs 3.25 cents base, plus freight. The aluminum alloy 24-ST, on which we gave strength characteristics, will probably sell for 24 cents per lb., plus freight. Stainless steel may cost in the neighborhood of 34 cents per lb. The price of magnesium may be as low as 25 cents per lb. Plastics cannot be at all fixed as to price, inasmuch as so many different kinds are manufactured and the quantity involved contributes largely to the final cost. As a guess, and for comparative purposes only, we might say that plastics will cost anywhere from 45 cents to $1.00 per lb.

Just from a cost standpoint the obvious deduction is that the low priced alloy steels have an advantage. The other factors are cost of maintenance and ultimate life of the equipment using the above materials. The answers to these factors can be as varied as the so-called authorities who are questioned and this is understandable inasmuch as the answers hinge on the conditions under which the equipment operates. Without looking into such variable fields as maintenance and ultimate life I shall confine my observations to the record.

Materials for 1944

At a conference called by the A. A. R. on December 14, 1943, which meeting included representatives of all the large steel companies and the aluminum industry, it was stated to the carbuilders present that for the year 1944 the carbuilders could only consider those materials with which we were familiar before we entered the war. By the way, this conference also fixed the designs of freight cars which the W. P. B. will sanction for con-

* Abstract of a paper presented before the Anthracite Lehigh Section of the American Society of Mechanical Engineers at Berwick, Pa., January 28, 1944. Due to space limitations that part of the paper pertaining to passenger car design will appear as a separate article in a subsequent issue.

† Vice president in charge of engineering, American Car and Foundry Company.

struction during the year 1944. The record, therefore, discloses that 1944 will not unfold any new materials for car construction. This eliminates all materials for the structural members of freight cars except carbon steels, alloy steels and aluminum alloys. The year 1945 may bring forth materials representing an advance in the physical characteristics for the benefit of the car equipment industry. However, at the present time, due to military secrecy or other considerations, we have not become acquainted with such materials.

Magnesium

Magnesium does not occur in nature as a metal but as an ore, in combination with other elements, known as magnesite, of which there were large deposits in Michigan. Owing to the vast demands of the war, these deposits were becoming so badly depleted that it became necessary to develop facilities for the production of magnesium from another known and unlimited source, namely sea water.

The electrolytic method is the most widely used method of producing magnesium from magnesite and, in the case of sea water as a source, a preliminary processing is necessary to get it to a state corresponding to magnesite. This consists, after a purifying process of the brine, by treating it with an aqueous solution of lime, from which magnesium hydroxide is obtained. The hydroxide is then brought in contact with hydrochloric acid, from which reaction magnesium chloride is produced. After being dehydrated and fused it is then ready, like magnesite, for the electrolytic furnace.

Briefly, in the electrolytic furnace either magnesite from the ore, or magnesium chloride from sea water, is decomposed in a bath by electricity and the magnesium is separated by collecting on the cathode which is really the cells or hull containing the bath. Because magnesium is lighter it floats from the cathode to the top of the bath where it is collected.

The outstanding property of magnesium is, of course, its lightness, it being two-thirds of the weight of aluminum. In order to be used structurally, like aluminum, it must be alloyed and heat-treated. It surpasses aluminum in machinability and can be cast, forged or extruded as easily as aluminum. It can be formed into sheets and plates but not as readily as aluminum. While from a weight-strength ratio it surpasses aluminum, its deflection is about twice that of aluminum, thus nullifying some of its weight-strength advantages where deflection is a factor to be considered.

Magnesium corrodes readily due to its affinity for oxygen and nitrogen, so it must be primed or painted to protect it from contact with moisture. It is not desirable for use where it comes in contact with excessive moisture or salt water. It has a bright silvery lustre, which quickly darkens by oxidization. So far no method has been perfected to anodize magnesium, like aluminum, to preserve its lustre and prevent oxidization.

It has a definite fire hazard in such forms as dust or chips which puts it at a disadvantage with aluminum.

Magnesium has not been so well known in the past and has not been used extensively before the present war. Due to its lightness it has found many applications in aircraft and as rotating parts in various devices where lightness is a factor to be considered.

With the vast facilities which have been developed to produce magnesium its cost, which has in the past been high, will naturally approach that of aluminum and open up many other fields for application in the automotive and industrial fields, as well as aircraft. It will have a place in passenger car construction in interior trimming, fittings, and hardware, where strength and appearance are not an important factor.

As stated above, not a great deal is known about magnesium in service. It has proved satisfactory in aircraft engine and fuselage construction and also very satisfactory where used industrially.

Undoubtedly much has been learned during the war about the production and behavior of magnesium, which is a military secret, but when this information is released it will probably open up unknown fields for application.

Plastics

Plastics are never found in nature, but are man-made and therefore synthetic materials. The plastics field is very broad in its scope and there are about ten principal basic compounds. Among these can be picked materials possessing desirable characteristics of strength, toughness, surface hardness, colorability and clarity. The same yardstick for measuring strength and hardness as used for metals do not apply for plastics, so careful selections for any requirement must be based on experience.

Plastics do not possess the same strength as metals and so in this respect are not comparable with the lighter metals although they are in weight.

Plastics can be readily molded into any shape and this art is well developed. In the railroad field plastics will be limited to interior passenger car construction, where appearance is a factor and not strength, such as hardware parts, trimmings, seat parts, window capping, table tops and in the fabric form for upholstery.

The use of plastic resins has been developed for plywood construction and for bonding of wood or steel. In combination with paper, cloth, asbestos and fibre laminations have been developed which possess a much higher strength than plastics. Micarta and Formica being examples.

Plastics are readily formed and machined, some have desirable resistance qualities to moisture, acid and alkalies, and also possess excellent thermal and electric insulation qualities. The field of thermal insulation for plastics is being rapidly developed and as yet not completely explored.

Plastics can be formed with excellent surface appearance very pleasant to the touch as compared to metals, and from the color standpoint any shade of color, as well as clarity is possible.

Surface hardness is subect to close study in the selection of a plastic compound for the particular use required.

The initial cost of dies for molding has kept the price of plastics very high in comparison with the lighter metals, so up to the present time the use of plastics has been in the industrial field of appliances, toilet articles, etc., where production is high.

Much has been predicted for the future uses of plastics and undoubtedly the use of this material will increase, but probably not as broadly as some of the enthusiastic promoters predict. The extent to which the possible uses of plastics will extend will depend largely as to how far the cost of materials and production will be reflected in the ultimate cost. It is definitely known now what the properties, characteristics, limitations and production of plastics are, so the increase in scope of their applications rests with the cost.

Freight Cars

All freight cars must meet the specifications of the A. A. R. for design and the I. C. C. specifications for safety appliances. Any cars not meeting these specifica-

tions will not be accepted in interchange. Consequently, any radical changes in design must first be submitted to the A. A. R. This body may consent to try out the new idea in experimental service. This tryout may extend for a period of several months or for several years. If then approved it can be applied to cars for interchange with the different railroads. The necessity for this is understandable inasmuch as the railroads must make sure that cars accepted for interchange; first, will stand the service; second, can be easily repaired; third, no hazard involved in their operation; fourth, meet all I. C. C. requirements; fifth, repair parts must be stocked so that cars can be kept running. Thus, when you read of Henry Kaiser or some other industrialist, not in the car game, converting their plants to the production of new types of freight cars, you can discount such statements because their first hurdle to get over in any heavy production will be that of having the new design acceptable to the A. A. R. and the I. C. C.

You might, therefore, gather the impression that the railroads and the car equipment industry are standing in the way of progress, but this is an erroneous idea. The facts are that the railroads through the A.A.R., and also by individual effort, and the car equipment industry are all continually developing new ideas, and improvements for railroad cars. A fact which is generally overlooked by the public in connection with railroads is that they sell transportation and are not basically manufacturers.

In other words, they do not have a manufactured product to sell but are buyers of equipment with which to furnish transportation. Thus, when people criticize railroads for lacking progressive ideas, they probably do not realize that developments in their rolling stock are first instigated by the equipment builders and then those improvements are subject to research and service tests by the railroad before being adopted. This procedure is slow but sure. The splendid record of the railroads should be a final and adequate answer to any such criticism. The A.A.R. Car Construction Committee have for years followed a program which is based in part on improving their rolling stock. New demands for speed and carrying capacity have brought new problems into the picture which were foreseen by the railroads and the equipment industry and, so far as consistent, developments made to forestall defects. As an illustration—the A.A.R. have been conducting for the last several years a series of tests of freight car trucks capable of sustained high speeds. In my opinion it is indeed fortunate that the railroads have adhered to the policy of approval of the A.A.R. before new ideas of equipment were placed in service, otherwise I am afraid that the magnificent job accomplished by them during this war could not have been made possible.

A Forecast

As a forecast of what we may expect in future freight cars, and again calling to your attention that this is only my opinion, I believe the following:

1. The conventional freight car will be several thousand pounds lighter than those in general use today.
2. Trucks will be utilized capable of speeds at least up to 80 m. p. h. without serious damage to lading.
3. The use of steel alloys for the majority of strength members in freight cars will become common practice.
4. A limited number of cars, particularly those because of lading are subject to severe deterioration by corrosion and oxidization, will be built of aluminum alloy.

Probable Post-War Car Business

One can read and hear all sorts of prophesies as to the volume of new car business for production after the war. There is no question but that a large volume of both freight and passenger cars will be ordered when the materials are available. The number, I suspect, will be somewhat dependent on the financial condition of the roads. Thousands of cars will be needed to replace obsolete equipment and cars unfit for service.

The forecasts vary all the way from 25,000 freight cars per year up to 175,000. Any formula used to arrive at some conclusion based on replacement due to worn out equipment plus obsolescence, plus potential car loadings and also plus economic demand for light equipment, results in a tremendous number of freight cars necessary to be purchased each year for at least a five-year period.

Other agencies employed in forecasting post-war activities use a formula based on revenue ton miles of anticipated business. A conservative estimate is probably that at least 100,000 cars will be purchased each year for at least a five-year period after the war.

It may be interesting to look again at the record in which we find that the Class I railroads in this country, have approximately 1,800,000 freight cars. Of this number of cars during the year 1942, cars retired were approximately 70,000 and cars built approximately 63,000. The above does not include privately owned cars. Knowing that freight cars are fast wearing out due to extensive use, it is not too optimistic to forecast that 100,000 new cars per year will probably be purchased.

The record of the totally owned cars by Class I railroads as of January 1, 1943, shows that 536,802 cars, or 30.8 per cent, are over 25 years old, and only 142,138 cars, or 8.1 per cent, are under 10 years old. It requires no stretch of the imagination to realize that with over 500,000 cars over 25 years old and still in use, the requirements for the first post-war five years could easily be 500,000 cars.

The forecast for new passenger cars likewise varies all over the map, but the record undoubtedly gives a good basis for a guessing contest of the potential future car business.

The record as of January 1, 1943 shows that the Class I railroads in this country owned 38,050 passenger cars. Of these 19,175 cars, or 50.4 per cent are over 25 years old. Under 10 years includes only 1,441 cars, or 3.8 per cent. A passenger car over 25 years old, of course, means that it was built before 1917 or before the first world war. Manifestly, such cars cannot be conceived as modern by any stretch of the imagination. Any prophesy, however, as to their replacement in my opinion, cannot be based on age only, inasmuch as many of these old cars can be used in short haul and suburban service. However, railroads must equip their mainline trains with modern equipment of the last word if they expect to retain and acquire traffic. A recent survey made by one of the largest industries in this country forecasts that 15,000 passenger cars of all types will be purchased in the post-war period. I do not believe that this forecast intended to state that this number of cars will be built in the first year. As a matter of fact, the passenger car building capacity in this country at the present time is only slightly over 3,000 cars per year. I doubt very much, therefore, if even 3,000 cars per year will be purchased by the railroads for the five-year post-war period. Even in these days of astronomical financial figures the expenditure of money in buying say, 100,000 freight cars per year and 3,000 passenger cars per year, together with the motive power and maintenance equipment—even with normal prices prevailing—can easily approach one billion dollars.

Norfolk & Western Terminal Capacity Increased

(*Continued from page 104*)

and despatched west without turning to Bristol or to Bluefield.

The photograph, Fig. 1, shows the two outbound inspection buildings, track arrangement, and engine washing platform, with the enginehouse in the background. These two engine servicing buildings, which are 30 ft. wide by 163 ft. long, were erected over inspection pits 135 ft. in length. The buildings are of brick construction with concrete floors, and are equipped with sliding end doors which may be closed in inclement weather. The interior of an engine inspection building is shown in Fig. 2.

In developing a lubricating system where a modern locomotive can be quickly and thoroughly lubricated with as many as five different lubricants simultaneously, a tip was taken from the modern automobile lubritorium. The system is so arranged that all lubrication is done from pressure hose. The engine and valve oils are pumped directly from storage tanks in the oil house through two overhead pipe lines. These two 1½-in. pipe lines which carry the engine and valve oils were placed in a 6-in. pipe casing together with a ¾-in. steam line so as to insure the flow of oil in cold weather. The greases are pumped from standard shipping drums (located in the inspection buildings) through pipe lines to the various stations in the buildings. There are four stations on each side of the building, and in addition, engine and valve oils are available at four locations in the pit.

Fig. 3 shows a close-up of the various hose and fittings used in lubricating a locomotive. At this particular station there are six hose, containing:

(1) Valve oil used in mechanical lubricators for lubricating valves, cylinders, slip joints, feed-water pump, air pump, stoker, parts subjected to steam temperature, and split-housing type of roller bearings.

(2) Engine oil used in mechanical lubricators for lubricating driving-box shoes and wedges, engine-trailing-truck and tender-pedestal shoes, crosshead guides, spring- and brake-rigging pins and bushings, reverse-shaft bearings, radial buffers, truck lubricators, etc.

(3) Soft grease used in lubricating various valve-gear parts, wrist and knuckle pins, and friction wedges not equipped with mechanical lubrication.

(4) Semi-fluid grease used in lubricating roller bearings of the floating-axle type.

(5) An air hose used to operate a rod-cup gun for filling rod cups with hard grease. This grease gun is shown on the extreme right in the photograph.

(6) Extreme-pressure oil used in lubricating the side-rods equipped with roller bearings.

Fig. 4 illustrates the lubrication of a modern locomotive. The first employee is lubricating the valve gear with soft grease. The second workman, standing on a stool, is filling the mechanical lubricator with valve oil from the pressure hose. The mechanical lubricators are equipped with snap fittings, which conserve time and insure clean oil entering the lubricators. The third man is lubricating the roller-bearing side rods with extreme-pressure oil. At the same time workmen are filling the two mechanical lubricators on the right side of the locomotive, and lubricating the valve gear and side rods.

When the locomotives are inspected on the incoming inspection pit, the reports of the inspectors are conveyed to the engine-terminal office by means of a pneumatic tube. If the foreman decides to service a particular locomotive in the engine sheds, a detailed report (Form MP-62) is sent to the inspection shed by pneumatic tube, the work is done, and the report is returned to the office by means of the pneumatic tube.

Average Time for Servicing Operations

Ash pit, minutes	22
Inspection pit, minutes	17
Coaling station (including taking sand), minutes	8
Washing platform (including blowing down and taking water), minutes	18
Engine inspection sheds, minutes	22

A study has been conducted of the time consumed at Shaffers Crossing in the various servicing operations on locomotives. This is shown in the accompanying table.

This time study also shows that the number of locomotives switched back without being turned is 35 per cent, the number of locomotives turned on the turntable but not placed in the roundhouse is 28 per cent, or the total locomotives serviced without being placed in the roundhouse is 63 per cent. The total motive power turning time, which is the time elapsed between arrival of a locomotive at the ash pit until it is actually made ready for service, all classes of locomotives, for an average day at Shaffers Crossing, is 3 hr. 52 min. In weighing the time consumed in servicing these locomotives it should be pointed out that a majority are heavy articulated locomotives with a tractive force up to 152,206 lb.

These improved engine servicing facilities have stepped up the despatching of locomotives at Shaffers Crossing, enable the motive power to be more fully utilized, and represent a development in engine handling facilities that have kept pace with the modernization of motive power.

The Requirements of Good Railroad Supervision

(*Continued from page 107*)

and select men who not only have the necessary qualifications, but who have and put into effective use the personality that makes for successful administration. Good judgment, common sense, willingness to learn, ability to use experience and good advice of others, constitute some of the personal characteristics. These, when applied in the execution of ideas or policy declared by management, create opportunity for bigger, more responsible and higher paid positions, and it is only natural that the man who has aspirations views his present position as a stepping stone towards the goal as head of a department, and so on; thus, when vacancies occur, promotions are made without disrupting or impairing the efficiency of a smooth-running organization.

Finally, we, as railroad men, must continually remember the fact that in our work the man problem—the human element—is of utmost importance. Increased efficiency of railroad operation, lowering of our operating ratios, improvement of our service, increased safety of operation, all depend to a large degree upon the human element. Summing up the whole thing in a nutshell—the important thing for the supervisor to remember in handling men is the fundamental rule, and that is that old rule laid down two thousand years ago by the Son of a Carpenter, "Do unto others as ye would that they should do unto you." Supervision adopting this principle will build for themselves and their railroad good will and good reputation.

EDITORIALS

An Opportunity for The Car Department Officers

By and large the great bulk of railway freight-car repair work, including some pretty heavy repair operations, is done in the great outdoors with nothing but the sky overhead and the earth underneath, with relatively few tools and limited mechanical facilities for performing the work. This condition is more or less general throughout the country and delays equipment and increases repair costs, particularly in those sections subject to excessive temperatures, either hot or cold, and inclement weather including rain, snow, mud, ice, etc. The man who thinks that car-repair work can be done efficiently under such conditions ought to have to patch a steel car side in sub-zero weather, repair a roof in a downpour of rain, change a pair of wheels in snow or mud, or make out a repair card when fingers are numb with cold.

Railroads are now handling a record-breaking traffic and making money, a substantial percentage of which will be authorized for the purchase of new freight cars in 1944. What the railroads need is maximum serviceable freight-car miles per day and new equipment is only a partial answer to this need. Rapid and efficient repair of equipment now in service is an equally or probably even more important factor. It seems apparent, therefore, that if capital expenditures are justified for new freight-car equipment, a reasonable proportion of railway earnings might also well be spent to modernize the facilities needed for maintaining these cars.

Looking to the solution of the general freight-car maintenance problem, one of the first steps, which has already been taken by a considerable number of railroads, is the concentration of freight-car repairs in a smaller number of shops and repair tracks, strategically located throughout the system. This eliminates many small outlying points with attendant important savings in labor cost, reduction in material inventories, overhead expense and other items chargeable to freight-car maintenance.

The next step is the re-arrangement (where necessary) and equipment of the repair points selected for just as efficient operation as possible considering the physical layout of the shop buildings and repair tracks. In fact one of the main considerations in deciding which of the smaller repair tracks should be eliminated is whether the physical layout does or does not permit satisfactory operation, as for example, efficient handling of material and the straight line method of car repairs where this is desired. Labor-saving tools and devices are a vital necessity, second only to protection from the weather for the efficient handling of heavy car repairs.

With almost every organization, including the railroads themselves, looking ahead to conditions after the war and developing specific post-war plans, it seems reasonable and in fact essential for railway car supervisors to find some means of breaking away from their present arduous daily tasks at least long enough to form some estimate of what they are going to be up against in the way of car maintenance in the future. The necessities in the way of repair shop buildings, tracks, tools and organizations ought to be studied and, if Russia can have a five-year plan, what is the reason that railway car men individually and collectively should not also be working on a carefully-developed five year plan. It is obvious that big tasks and projects cannot be carried out in a minute or a year, but with the full picture of car repair needs over a period of years outlined in advance, it should be feasible to complete one section or unit each year. The result would be, therefore, that, in a surprisingly short time, railroads would find themselves equipped with notably improved facilities for the important work of maintaining freight-car equipment.

There is no organization in the country which, through its individual membership and collective experience, knows more about the details of car repair work and how it ought to be performed than the Car Department Officers' Association. This group includes many of the best-informed and most-aggressive car officers and supervisors on individual railroads throughout the nation. It would seem to be a constructive goal for this association to study and seek to set up the essential features of construction and equipment of railway shop facilities for handling the various classes of freight car repairs, including primarily (1) heavy building and rebuilding programs at one central shop on each large railroad; (2) medium, cycle repairs at a few shops, strategically located on the system; and (3) running repairs which must be made at a larger number of small points in order to keep equipment in service.

The task of specifying these various car shop requirements is no easy one because America is an individualistic country and railway men are no exception to the rule. They have their own individual ideas regarding how work should be done and sometimes it is difficult to get carmen even on the same railroad to agree on what they want done. Eliminating relatively unimportant details, however, if it should be possible for car supervisors to reach a common understanding regarding fundamental requirements of car shops for the three classes of repairs mentioned and make that information available through published committee reports and official proceedings, so that individual railways which want to make an organized effort to im-

prove car repair facilities on a system basis will have specific recommendations to check against their own particular requirements.

The task of developing these recommendations is obviously "down the alley" of the Car Department Officers' Association and, while it is a big assignment, much can no doubt be accomplished by breaking it up into logical parts and attacking one at a time, possibly through the medium of committee reports presented over a period of years. The need for more authentic and authoritative information on this subject is urgent. A real opportunity and responsibility confronts the Car Department Officers' Association. Let us hope it recognizes the need and does something about it.

What About Dynamic Balancing?

For the greater part of the 10 years in which high-speed streamlined trains have been in service on this continent there has accumulated a steadily increasing weight of evidence pointing to the need of accurate balancing of wheels in high-speed trucks, whether they be in passenger cars or in locomotives.

This question of wheel balance is one that probably could best be solved by the dynamic method and there are several balancing machines of this type available that are suitable for the balancing of railway truck wheel sets. Those roads that have electric traction equipment or electric repair shops which handle repairs to large size motors are fairly familiar with the equipment and technique involved. It is reasonable to assume, however, that at least insofar as car-department men are concerned the question of dynamic balancing is one with which they are not too familiar and because of the need for the solution of the wheel balancing problem and their interest in finding a way to do it there are, at the moment, several important questions that should be answered for their benefit.

Several mechanical department people have raised the question as to what will be the effect of operating conditions such as slid-flat wheels and brake shoe wear on wheel sets that have been accurately machined and dynamically balanced. This is an important question that must be answered to the satisfaction of those concerned with wheel wear.

Some light on this general problem may be found in a paper prepared by K. F. Nystrom of the Milwaukee for inclusion in the 1943 Yearbook of the Car Department Officers' Association in which he deals with the question of wheels for high-speed service and includes the statement that "It is an important requirement that wheels under high-speed equipment be kept concentric within .010 in. Their treads must be smooth and fairly close to the original taper. This does not mean that a wheel has to be the original 1 and 20 taper or that it cannot be run with considerable wear but it does mean that the tread must not be allowed to develop local sharp tapers. The biggest factor in producing wheel shimmy is what the car department men class a second flange—a short sharp taper close to the throat of the main flange. Under high-speed equipment this second flange can cause wheel shimmying if as high as $\frac{1}{16}$ in. We have had cars with decided wheel shimmy when the second shoulder could be discovered only by feeling; that is to say, not perceptible to the eye when the wheel was in the truck."

There is hardly anyone familiar with railroad trucks and their operation who might not be willing to concede that to have wheel sets in dynamic balance is most desirable. It is also apparent as evidenced by Mr. Nystrom's statement that a very slight amount of wear will set up undesirable conditions such as shimmying in a car wheel at high speed. Here is one evidence of unbalance due to wear.

At the present moment tests are being made to determine the value of this type of balancing and in the interests of making available the technical data which so many are awaiting with interest, it seems worth while for the railroads and the manufacturers to work together in an effort to find out to just what extent dynamic balancing may contribute to the difficult problem of high-speed railway truck design and operation.

Train Telephone

Over a period of several weeks, the railroads have been taken to task by Drew Pearson on the radio, for their failure to employ "radio-telephones" on trains. According to his statement, had trains been so equipped, recent disastrous wrecks could have been avoided. This statement indicates rather complete innocence on his part concerning what the railroads do to protect passengers, and what they have done and are doing toward the development of train telephone.

In the first place, the Pearson criticism discounts the railroads' long and enviable safety record. It says in substance that wayside signals, cab signals, centralized traffic control, operating practices, etc., are inadequate and implies that train radio, unlike all other devices, would not be subject to equipment failure or man failure.

For the record, it should be recalled that the manufacturers and the railroads have been working to develop an adequate train telephone for a long time. A carrier-current system was tried out in 1925. One radio-telephone was installed in 1926, and another in 1927. An inductor type system, using the rails and a wayside wire, appeared in 1933 and was quite thoroughly tried out. Over the same period of time there were other systems falling into these general classifications which were also tried. Variously, they failed to fulfill all requirements. In the case of the "radio-telephones" referred to by Mr. Pearson, they were unable to maintain continuous communication at all times, and since they broadcast their sending, it was necessary for the Federal Communication Commission to grant

a license for their operation. This it did in the form of experimental licenses, but since there is such demand for wavebands up to and including the so-called "short waves," it seemed improbable that a permanent license could be issued for railroad application, and the manufacturers did not feel that they could continue with development work under these circumstances.

The "earth-current" system was brought out in 1937 and this has now been developed to produce the system used on the Pennsylvania as described elsewhere in this issue. Carrier-current systems are in service in a number of yards for both two-way and one-way communication.

A layman might have cause to wonder why such communication systems were not installed the moment they were conceived. Anyone entertaining the thought should be reminded that once a system is adopted, it must be generally applied to be effective; and since it is inherently a device for improving train operation rather than one for promoting safety, it is important for the railroads to find one which meets all requirements before committing themselves to a certain type.

With specific reference to radio-telephone, there is reason to suppose this may become available for railroad service. Micro-wave sending and receiving radio sets can now be made which work in the million-cycles range where an almost unlimited number of assignable bands are available. They do not broadcast in the ordinary sense since they are limited to visible distances and they can furthermore be beamed to send in only one direction. Unfortunately for the railroads, their present development is still a military secret and their application to railroad operation must wait until the end of the war.

The Steam Locomotive Now and in the Future

One of the important factors favorable to the conventional steam locomotive in economic comparisons between it and other types of motive power is its relatively low first cost. To undertake future development along lines which appreciably narrow this advantage, unless one or more of the outstanding advantages of other types of motive power are thereby substantially reduced or offset, is to weaken its competitive position.

It was to the preservation of this advantage of the steam locomotive that General Young* addressed himself last December when he questioned the justification of the variety of types of steam locomotives purchased and, indeed, of the variety of designs of each type which prevent the building of locomotives in lots of sufficient size to permit the application of production methods. To attain the advantage of low first cost in production implies a very considerable degree of standardization not only of basic wheel arrangement but also of boilers, beds, cylinders, wheels and of many other details.

But, even though it is more than a century old, the steam locomotive has not yet reached a final state of perfection. Standardization should not be allowed to close the door to changes of demonstrable value. The character of worthwhile developments to which the steam locomotive may well be subjected is partially indicated by the variations in the proportions of locomotives of the same type which were pointed out by General Young. They would include some attempt to determine the optimum relationships between grate, heating surface and cylinders. It is possible that studies of these questions might lead to the conclusions that, between considerable limits, one choice is about as good as another. Such a conclusion, once widely accepted, should go far toward making agreement possible on standards which would influence first cost in the right direction.

The issue with respect to the basic proportions of the locomotive are to some extent confused by factors of locomotive design which are not yet generally subject to statistical appraisal. Perhaps the most important of these is the whole chain of communications between the boiler and the cylinders. On the adequacy of the capacity of these passages depends the maximum boiler capacity and the efficiency of the boiler in the high-output range. Equally dependent on these passages is the maximum horsepower developed in the cylinders.

Even on the boiler there are conflicts in ideas. For instance, which is most important: the relationship between grate area and gas area through the boiler, or the relationship between grate area and heating surface? Other factors affecting boiler output and performance, named by C. A. Brandt,† late chief engineer of the Superheater Company, are the proportion of firebox heating surface, and the hydraulic depth and length of flues.

There will always be the need of improvement and refinement in the design of mechanical details, a field closely related to metallurgical progress. Experience with one all-welded boiler justifies the exploitation of this construction. Only experience will determine its full economic value.

Those interested in the future of the steam locomotive face the delicate task of eliminating useless variations in design and at the same time pushing forward certain lines of research and development. Locomotive history should crystallize opinion behind the proposition that there are many design variations, useless in themselves, and against overall economy. The railroads and the manufacturers have been associated with each other so long that they should be able to achieve a degree of cooperation sufficient to study a few fundamental questions on which no common understanding has yet been developed.

* See "A. S. M. E.-A. I. E. E. Discuss Selection of Motive Power" in the January, 1944, *Railway Mechanical Engineer*, page 2, an abstract of an address by Brig.-Gen. C. D. Young (retired) delivered before a session at the 1943 annual meeting of the American Society of Mechanical Engineers sponsored by the Railroad and Oil and Gas Power Divisions of that society and the Committee on Land Transportation of the American Institute of Electrical Engineers.

† See "A Study of The Locomotive Boiler," in the February, 1940, *Railway Mechanical Engineer*, page 43, an abstract of a paper presented by Mr. Brandt at the 1939 annual meeting of the American Society of Mechanical Engineers.

More Miles from Passenger Cars

In spite of the combined efforts of the railroads and the O. D. T. to discourage passenger travel, the railroads continue to be taxed to the very limit in handling an unprecedented traffic. New passenger cars are not available and every possible device has had to be resorted to to increase the utilization of the existing equipment to a very maximum. Naturally the mechanical department has had to play an important role in the stupendous effort which is being made to squeeze every possible passenger-mile out of the cars and locomotives.

In an effort to contribute in a practical way in this emergency the *Railway Mechanical Engineer* last month announced a roundtable discussion on how to get more out of the passenger cars. In effect, these pages are therefore a clearing house of the great variety of ways in which the mechanical department is exercising ingenuity and effort to keep the cars rolling, in spite of equipment and manpower difficulties.

We should like to take this opportunity to express keen appreciation to those whose contributions appear, for the fine way in which they have supported us in this endeavor. True, there is a certain amount of duplication in the various expressions and, yet, each one contains some concrete and practical suggestions not voiced by the others. Taken as a whole, they dramatize in a decided way the thorough and constructive effort which is being exerted by the mechanical departments of our railroads to do their full part in helping to win the war.

Atchison, Topeka & Santa Fe

We have been confronted with an unprecedented demand for passenger-carrying equipment and in order to meet that situation, it has been found necessary to intensify the efforts of those in supervisory capacities who have to do with the servicing and furnishing of equipment. Hearty and result-producing cooperation in that respect has been realized and to that, more than any other feature, we are crediting our ability to establish the performance thus far attained.

There are, of course, many problems which come up daily which must be met in a satisfactory manner, but it would be burdensome to undertake to set out for publication any number of these; in order, however, to illustrate what we have in mind, mention might be made of a problem in connection with the operation of dining cars:

It had heretofore been the practice to provide linen table covers in the dining cars. The increased number of passengers to be fed materially increased the amount of linen required and this demand could not be met with available laundry facilities; likewise, the wear and tear progressed and replacement linen was not procurable. In order to meet this situation, it was necessary to improvise a satisfactory covering for our dining car tables, and again we were confronted with limited types of material available for this substitution. After casting about hurriedly we found a source of supply of a satisfactory type of linoleum, and in order to avoid the delay and loss of service of the dining cars in making the required change-over, complete car sets of dining car tables with the substitute covering were made up and shipped to our principal passenger terminal layover points, so that the existing tables could be removed and the modified tables applied. In that way the entire fleet of dining cars was remodelled in a very short time without any loss of the use of cars in their regular assignments.—*J. M. Nicholson, Asst. to Vice-President.*

Chicago & Eastern Illinois

In the "good old days":—Coach 2501 is in the coach yard with the pedestal liners badly worn and the boxes cocked, the brake hangers pretty badly worn and a considerable amount of work necessary, but the car will make a few more trips and we will hold it out all next week and get the work done. But this was in the "good old days," when there were plenty of coaches available and it was possible to hold a coach out of service to do this work.

Under present conditions, with the necessity for keeping passenger car equipment in service, the coach yards are anticipating their work and keeping up the repairs in a piecemeal fashion so that the car will not get in a generally defective condition. It is not uncommon to start on one end of a train and overhaul the cars one truck at a time, even though they are not at the point where repairs are absolutely necessary at the moment. By the time the work is completed on the entire train, it is time to start over at the head end again. In this way, we have learned that it is not absolutely essential to hold passenger car equipment out of service for long periods of time for maintenance and running repair work.

This practice is aided very materially by having more complete and detailed reports of troubles and difficulties experienced on the road. These reports are made by train crews and by inspectors at intermediate points, so that even before the passenger car equipment arrives at the coach shop the forces are well posted on exactly the conditions that need correction on the particular trip.—*D. J. Sheehan, Supt. Motive Power.*

Chicago Great Western

In our passenger yards where troop movements must be serviced, work was speeded up considerably by installing improved water lines with more outlets, thereby obviating the necessity of making more than one spot in the handling of 14 to 20-car troop trains. Approximately 20 minutes was cut off in the time usually necessary to service such trains.

At our important car-repair tracks, work was speeded up by installation of concrete runways, the use of small gas-propelled material delivery trucks and high powered air jacks.—*S. M. Golden, Vice-President.*

Chicago, Rock Island & Pacific

Among some of the things that have been necessary are the following:

We made no particular outstanding plans in our terminal train yard operation that were not already in effect prior to the war period, except to speed up the handling. We took a considerable amount of passenger-car equipment out of storage that had been set aside because it was not needed and was generally worn out, reconditioned it and put it back in regular service. We intensified the pooling of cars among the various trains and reduced the layover period, so as to get a better utilization of the equipment. The general shopping of cars was reduced to a minimum by increasing and spreading out the repair forces and doing more extensive running repairs.

We made some changes in dining cars and other passenger cars, to increase seating capacity. We removed some passenger equipment that had been assigned to work train service and caboose service on branch lines, reconditioned it and reinstated it in revenue passenger service. To reduce layover time and maintenance time further

we equipped ourselves with spare parts, such as extra running-gear parts, seats, chairs, ranges and other kitchen and passenger-car appurtenances, so that these parts can be changed out as needed during layover periods, without cars missing their runs, thus avoiding the necessity for shopping. In other cases, where the layover was short, we laid out our work in such manner as to do a part at each layover period until the particular job was completed, and without any inconvenience to the public.—*G. P. Trachta, General Supt. Motive Power.*

Delaware & Hudson

Needless to say, with the limited supply of cars available, it is necessary to keep as many as possible in active service to meet the unprecedented volume of passenger traffic. Obviously, it is imperative that the number of unserviceable cars be kept at the lowest possible minimum. To attain these objectives is the function of the car department.

While the critical shortages of material and the manpower situation have made the task no easy one, our supervisors have been and are constantly seeking ways and means of meeting the emergency. It calls for all the ingenuity and resourcefulness they can exercise. The element of time is so important that constant planning and rescheduling of work is necessary to secure the maximum in efficiency with the facilities at their disposal.

It is difficult to single out any one item that has contributed more than another to the progress made, since I feel everyone is conscious of his responsibility on the home front and is displaying an excellent spirit of cooperation to get the job done in the shortest time possible.

True some changes have been made to effect prompt release of equipment. Some of these may be of interest, as for example:

1. Normally, it is our practice to schedule cars for periodical overhauling and repainting. Due to the lack of extra equipment, the shopping of cars today is determined by an actual inspection of the unit, with the result that only such cars as actually require attention are withdrawn from service. Thus better control is had of shop capacity and plant facilities, and fewer unserviceable cars are held awaiting shop.

2. Labor saving facilities, such as track pit installations, expedite repairs, particularly truck details; car pulling devices minimize delays in moving cars in and out of shops; portable welding machines permit more extensive welding operations; intensified use of tractors over well maintained roadways permits expeditious handling and delivering of materials, etc.

3. Cars, of course, must be maintained in a sanitary and presentable condition for the convenience and comfort of the traveling public. The requirements are very exacting and must be met at the terminal where cars receive attention. The daily routine of servicing and cleaning must be done promptly and on schedule in order that the cars will be available for the consist of designated trains. To that end we follow a system whereby the work is carried out in an efficient and orderly manner. For example, the force is organized in groups, with each group receiving a definite assignment and specializing in certain operations. This tends to speed up the performance, since it avoids confusion and interference from overcrowding which so often is the case when too large a gang is assigned to a car, particularly on interior work. Incidentally, close observation is constantly made of our equipment by those in charge to see that cars receive proper attention from the standpoint of thorough cleanliness, which eliminates to a large extent the necessity of taking cars out of service for heavy cleaning.

Frequently, cars are cut out of trains for light repairs which require immediate attention upon the arrival at the shops. We endeavor so far as possible to make such repairs in the yard to avoid extra switching. In such circumstances the importance of close cooperation between transportation and car departments is obvious. I am happy to say that such cooperation prevails, with result that representatives of both departments are made acquainted with the requirements of the service, and knowledge, therefore, is had of the equipment available to meet such requirements.

It is doubtful whether I have added anything novel or constructive to this discussion, since I feel that whatever success has attended our efforts in this emergency can, in the main, be ascribed to cooperation and coordination of forces together with intensified use of existing facilities.—*R. J. Mason, General Foreman.*

Denver and Rio Grande Western

Our mileage of system cars only for the year 1943 increased 22.71 per cent over 1942, without increasing quota. This was accomplished by:

Better distribution of equipment; that is, cars were sent to points where service was anticipated, instead of holding at various stations for emergency.

Cars were relayed. Diners were cut out at the first available station after need for their service ceased, and picked up by train in opposite direction, thus avoiding long layover at terminals.

Coaches partially loaded were cut out when it was possible to transfer their passengers to other cars. Baggage cars were handled in a similar manner. Both types were thus available for earlier movement, instead of long layover.

Lounge cars were assigned to coach service.

Repairs were speeded up by working overtime whenever practicable, decreasing dead time.

Cars were inspected, serviced, and repaired when possible, at stations instead of car yards, reducing the time out of service and making them available for immediate service on other trains. To do this, automobile service was furnished between car yards and stations for transportation of men and supplies. Portable equipment boxes were located at convenient points at stations, containing necessary supplies and tools, including special journal jacks which allowed quick attention to boxes without moving cars away from station platforms. In some cases of high platforms, ordinary jacks cannot be used efficiently.

Since the start of the war we have installed yard inspection pits and two modern yard drop pits, each covering three tracks and release track, at the principal terminal. Also inspection pit and drop pit in coach shop. At other terminal there have been installed inspection pits and three track drop pit. All inspection pits are provided with car pullers.

Regular schedule of shopping has been modified to the extent that no cars are held out of service, waiting.—*P. C. Withrow, Asst. to Chief Mechanical Officer, and L. H. Day, Supt. Car Department.*

Great Northern

The problem of providing maximum service from the limited number of passenger cars available has been a trying one, necessitating extreme alertness, careful planning, and a lot of on-the-spot sound judgment and native ingenuity.

Among major items are: Postpone general shopping as much as possible by giving the car a quick intermediate light repair turnover, at which time worn parts important to safe running of the car are put in good condition. Keep the number of cars in the shop at lowest possible minimum and work two or three shifts to expedite movement through the shop. Press into regular service cars ordinarily held at different points for protection service. Many car-days may be saved on shorter runs by arranging for turn-around service or by continuing the car on a connecting run, thus materially reducing idle car time and releasing cars for other runs. When cars are bad ordered have immediate repairs made quickly so car may be promptly returned to service. Have on hand such devices as occasionally fail and change out the bad order device rather than hold the car out of service.

In coach yard have good, alert supervision so that the most urgent work shall be given preference and all work be efficiently handled. Keep all appliances, such as wheels, journal boxes, air brakes, couplers, draft gears, heat, etc., in good condition, thus avoiding in-service failures. Many setouts for cut journals may be avoided if upon arrival of the train at inspection points journals are carefully "hooked" to remove grabs and wipes, using a special hook for that purpose. If a bearing is found running at an abnormally high temperature it should be raised and cleaned, or renewed if necessary; this can be done in a very few minutes if, as should be the case, all necessary paraphernalia is handy; a potential hot-box delay or setting out of the car for a cut journal may be averted. A device that has saved a number of setouts is a small emery air grinder which we couple to the trainline and use to grind off built-up wheel tread metal caused by skidding.

Traveling train inspectors are a big help in checking and repairing in-transit such items as lighting, air conditioning, heating, care of journal boxes, etc.

Manpower shortage is the most serious obstacle, especially experienced personnel, so that it is necessary to utilize available help in such a manner that maximum results be obtained under such adverse conditions.—*I. G. Pool, General Supt. Motive Power.*

Minneapolis, St. Paul and Sault Ste. Marie

Speeding up in servicing the equipment has been accomplished by working yard employees overtime and by passing up some of the repair work in our shops and doing the work that is necessary to keep the cars in a safe running condition. The result of this is that we are behind with our regular shopping.

We have no new tricks in management—just long hard hours for our supervisors and men. However, our three-shift set-up in the shop has helped more than anything else to enable us to recondition a car in one-third of the time ordinarily used on a one shift a day system.—*A. M. White, General Foreman Passenger Cars.*

Missouri Pacific

The maximum utilization of passenger cars essential to meet wartime exigencies is in a large measure dependent upon the length of terminal detention. The problem of increasing the availability of this equipment for service is basically one of expediting inspection, repairs, cleaning and servicing to the fullest practicable extent.

Essentially, inbound inspections should be completed as promptly as possible after arrival of trains at terminals so that sufficient advance preparations may be made to perform necessary repairs without incurring any undue delays.

Cycle terminal repairs, such as the C.O.T. &S. of air brakes; periodical repacking of journal boxes; renewal of worn wheels, and work of similar character should be anticipated and so scheduled as to prevent excessive accruals of cars for such attention at any one time and thus avoid delays in bad order.

The peak requirements have confirmed the feasibility of accomplishing during layover periods of cars considerable work which previously involved release of equipment from service for repairs. Typical of work that can be performed within reasonable lay-over periods are such items as replacements of seat cushions and backs, window sash, curtains in car sets, carpets and composition floor coverings, painting of car floors and touch-up painting.

In like manner the unprecedented volume of traffic and the more constant usage of equipment under present conditions, with resultant accelerated wear, have led to the realization that certain more extensive maintenance, intermediate to scheduled shopping of cars, can be taken care of in passenger car repair yards with an appreciable reduction in the time cars would otherwise be held out of service for advanced shopping. The following operations are representative of attention which ordinarily can be given at terminals to passenger cars within an average period of four days:

Essential repairs to trucks, draft and buffer arrangements and brake rigging.

Repairs to air conditioning and electrical equipment.

Test and repair water, steam, air and signal equipment.

Door and window repairs, including weatherstripping.

Vestibule repairs.

Repairs to seats and renovation of upholstery.

Floor repairs.

Exterior and interior repainting, including relettering.

It is equally important to reduce to a minimum the number of cars and time in shops for classified repairs, and these results can be enhanced by scheduling work in advance and having proper materials available before cars are shopped.

Where the lay-over period of passenger cars in yards is extremely short, it has been found advantageous to utilize the available time between arrival of trains at passenger stations and movement to yards for preliminary interior cleaning, and conversely to perform final touch-up cleaning during movement from yards to stations.—*L. R. Christy, Supt. Car Department.*

New York Central

The unprecedented volume of passenger traffic has brought about the most intensive use of passenger cars that railroads have ever before been called upon to meet. To cope with this situation, which resulted in a very substantial increase in car mileage, greatly increased car maintenance, with the shortness in layovers at terminals, has severely taxed facilities for carrying on this work. Drop table facilities, which are adequate to take care of the usual amount of work with one shift operation, have had to be manned to provide for two and sometimes three shifts, and in view of the high mileage that the cars are making, special inspection and maintenance forces have had to be increased to make possible the prompt turning of cars at terminals.

Because of the difficulty encountered in sparing cars for the shop, the reconditioning of trucks, which includes brake rigging and the maintenance of draft gears, has had to be resorted to at carefully selected outside points. Improvements in designs of parts, which were troublesome, have been accelerated to reduce the amount of maintenance work at turnaround points, and the adoption of self-locking and self-spreading types of cotters for use in brake equipment pins has largely overcome the loss of pins en route. The adoption of a systematic plan for general maintenance of air conditioning equipment at periods other than when cars are shopped for general repairs, has substantially lessened terminal maintenance with improved continuity of performance.

Reduction in switching of cars at terminals incidental to making up trains gives the inspectors and maintenance forces more uninterrupted time to perform their work. Application of metal of the anti-skid type to vestibule platforms and trap doors, thus eliminating the rubber tiling which has to be replaced when worn, has saved considerable in maintenance at terminals. Advantageous locations of emergency repair materials at intermediate terminals contributes greatly to reduction in terminal detention.—*W. H. Flynn, General Supt. Motive Power and Rolling Stock.*

Norfolk & Western

The intense utilization of passenger equipment cars under war conditions has been made possible by speeding up inspection, servicing, and heavy repairs. Some of the more important methods used to keep passenger equipment cars rolling are as follows:

Decrease the time required for shopping. In pre-war days it was customary to keep a passenger car in the shops four to six weeks for heavy repairs. Now, for the same class of repairs, the time has been reduced to 12 to 14 days.

Particular attention should be given to the draft gears, couplers, equalizers, brake rigging, wheels, journal-box assemblies, etc., when the cars are shopped. The application of heavier couplers to cars is a good investment and will pay dividends in these war times when trains are abnormally heavy and long.

Passenger-car equalizers should be given a Magnaflux inspection at shopping periods so that all inherent defects may be discovered and defective equalizers discarded.

Drop-pit jacks for removing passenger-car wheels should be installed at the principal coach yards. In cases where a passenger car comes into a terminal with a hot box and scored journal, the wheels can be dropped and a new pair applied, and the car can be continued in the train with a delay of approximately thirty minutes for changing wheels. This is of particular advantage in handling military movements.

Install mechanical car washers at terminals located at the ends of runs so that passenger equipment cars can be quickly washed and made ready for service.

The use of porters to assist in cleaning the interior of cars on line of road is a great benefit to the general appearance and cleanliness of the interior of the cars.—*C. E. Pond, Asst. to Supt. Motive Power.*

Pennsylvania

Unprecedented passenger travel and its attendant increase in passenger car servicing and maintenance, have heavily taxed established facilities. This, together with the loss of trained personnel, made necessary certain expeditious measures to meet the situation, among which were the following:

1. Augmentation of total seating capacity of existing equipment to the extent of more than 16,000 seats by conversion of parlor, sleeping and observation cars to full coaches; also modification of, and installation of seats in, the baggage and mail compartments of combined type cars in addition to conversion of a number of freight box cars to coaches. Also fitted up forty troop sleepers and four kitchen cars by modification of box cars.

2. An on-the-job training program for new employees, male and female; also training of employees for positions requiring more skill as well as training of candidates

for supervisory positions, in anticipation of changes in force due to employees either voluntarily entering the armed forces or induction into military service.

3. Installation of additional tools, such as cutting and welding equipment, power jacks, hoists, etc., to lighten and facilitate the work, particularly where women are employed.

4. Installation of rest room facilities for women.

5. Pre-fabrication of material, as far as practicable, to reduce labor at point of application and have it readily accessible.

6. Accelerated anticipation of material requirements to avoid out-of-service delay to cars awaiting material.

7. Simultaneous performance of periodic maintenance operations to reduce number of shoppings per year.

8. A program of truck overhaul at a central repair point and exchanging trucks under cars, to avoid time of cars out of service while trucks would ordinarily undergo repairs.

9. Arrangements have been completed for the installation of mechanical car washing machines, both permanent and portable, for exterior washing of cars, to release a number of employees for use on interior cleaning work.

10. Traveling car cleaners placed on trains which not only keeps cars in presentable condition enroute but lessens servicing time in yards and terminals, which is of particular advantage on short turnaround movements.—*H. W. Jones, Chief of Motive Power.*

Southern Pacific—Los Angeles

Additional forces of trained and qualified people have been added to our supervisory staff to facilitate the handling of equipment and functioning of our organization.

Key supervisors have spent considerable time educating and helping younger supervisors bring about coordination between the various crafts and new help acquired as the manpower turn-over resulting from selective service has made it mandatory to school workmen and supervisors as well. A suggestion system for employees, which has been encouraged, has proved beneficial to workmanship and output.

A public address system, with the microphone in the administration office, over which instructions and directions can be given to the various supervisors and lead people throughout the entire yards has proved invaluable as a time saver.

A large master bulletin board bearing the numbers of the various tracks, the train consist on each track, and time of departure of the equipment from the yards serves as a time saver to all departments and particularly to new employees.

Our cleaning forces are organized in groups with lead people all working under general supervision of coach cleaner supervisors. We have found it advantageous to specialize these people, assigning various groups to different phases of the operation, such as outside scrubbers, inside cleaners, window cleaners, truck cleaners, icing and watering crews, etc.

Our electrical crews are grouped and assignments so made that there is no retracing of one another's work. A bulletin board is maintained in the electrical shop where any jobs of a special nature are posted and assigned; upon completion of the job the notice is removed. All electrical appurtenances, such as train lighting, electric elevator motors, fluorescent lighting motor alternators, radio, public address systems, and air conditioning are covered by this group under the supervision of electrical supervisors.

The paint crew is maintained to touch up interiors as well as vestibules, vestibule steps, outside sash and gothics and also maintain a regular quota of headend cars painted inside and out.

Periodical maintenance of this equipment is effected by the exchanging of parts, including cylinder pistons equipped with spring and packing cup. A similar practice is followed extensively with other materials, such as various types of doors, window frames, seats, tables, drapes, carpets, floor slats, toilet fixtures, etc.

We have an elevated track upon which our streamline equipment trains are placed for thorough inspection and servicing by the various crafts. There are two drop pits on this track for changing out car wheels which are delivered to and removed from the pits with automotive lift trucks from a central storage point in the yards.

We now have on order a Whiting passenger car washer which we anticipate will be an asset to the speeding up of servicing and turning of our passenger equipment. Upon installation of this washer in our Los Angeles coach yard, inbound equipment can be run through in its route to the designated service track where all operations will be stepped up due to no interference from outside wash gangs.

Women are employed in the making of loosely twisted packing rolls for ready application to the journal boxes. This method provides more uniform packing rolls and speeds up box packing operations, thereby enabling us to keep all equipment up-to-date in this respect.—*E. E. Packard, District Master Car Repairer.*

Southern Pacific—Sacramento

The large increase in the number of passenger cars handled by the Southern Pacific has taxed the main terminals to the utmost. Management, recognizing the necessity for fullest cooperation of all departments in successfully handling the increase, has held meetings with key men involved to bring out new ideas for quicker turning of equipment.

Cleaning Interior and Exterior—Cleaning passenger cars is one of the toughest problems confronting the terminals, and was overcome to a great extent by employment of additional women coach cleaners at the main terminals, and inauguration of this service at intermediate terminals where a passenger train would lay over for any appreciable length of time.

Each gang of cleaners was placed under the direction of a leader at both the main and intermediate terminals. This method allowed better supervision of gangs. Also, additional foremen were employed at the large terminals.

This same practice was followed in watering and icing, and in the application of toilet paper, towels, drinking cups, etc.

At Oakland (Calif.), which is one of the large terminals, a schedule board was erected in the approximate center of the passenger yard and thereon is posted the train number, track number, and car numbers in the consist of the train; also the time train is to be completed and taken out of yard. This schedule board is maintained by a clerk, who is in contact with operating forces at all times to obtain information for adding to or subtracting from the various train consists in the yard.

Painting—In order to keep up the general appearance and cleanliness of the equipment a system of cleaning and painting was undertaken at main shops, main terminals, and intermediate terminals. Wherever a passenger train laid over for a few hours this job was undertaken. In cases of local trains an extra car was sent to the layover terminals to be completely cleaned and painted and after receiving this painting it was placed in the local train and another car was taken out which required cleaning and painting.

On arrival of local train at main terminal the newly painted car was placed in a through train and one requiring cleaning and painting was taken from through train and placed in the local. A touch-up painting job was done when required. This touch-up paint job was done with quick drying paint and consisted of touching-up arm rests, window capping, sash, doors, base boards, panels, toilets and floors where marred or scratched.

Light and Running Repairs—Repairs found necessary were handled by the regular inspection and repair forces and consisted of repairs to brake shoes, brake beams, hangers, adjustment of brakes, checking of batteries and air conditioning units.

To watch this feature closely, management established positions of district air brake instructors, district car inspectors, district train lighting and air conditioning inspectors and air conditioning supervisors whose duty it is to ride trains, visit yards and terminals instructing trainmen and repairmen in the proper handling and repairing of equipment. Also, when equipment is not operating efficiently due to defect or failure, they handle with the nearest repair point for correction.

Improvement of Facilities—A long pipe attached to a hose was installed for supplying water to roof type storage tanks. This device allowed the operator to stand on the ground and to safely and efficiently water such cars, thereby saving man-hours.

A brush was developed for cleaning between the inside and outside windows of cars which has resulted in a saving of man-hours.

Wagons and containers for transporting ice have been devised which has resulted in more efficient icing of cars and in a saving of man-hours.

A hydraulic device is used for lubricating center plates, slack-adjusters, etc.

Specially built brake shoe wagons are used in terminals.

An elliptic spring press has been built for application of springs to trucks.—*W. J. Bartle, District Master Car Repairer.*

IN THE BACK SHOP AND ENGINEHOUSE

Bronze Electrodes For Welding Locomotive Parts*

By J. W. Kenefic†

Since the introduction of bronze bearing-metal electrodes for electric arc application about six years ago the merits of its use on certain wearing surfaces have been proved conclusively. This bronze weld metal is of a type developed specifically for application on driving box laterals and crowns and similar parts which are subjected to unusually severe service conditions. Having a high

Building up a main driving box after 50,000 miles of service—The face shows the condition of weld deposits on the lateral after the same length of service

lead and tin content it is of substantially the same analysis as the brass which is customarily poured in on driving-box laterals.

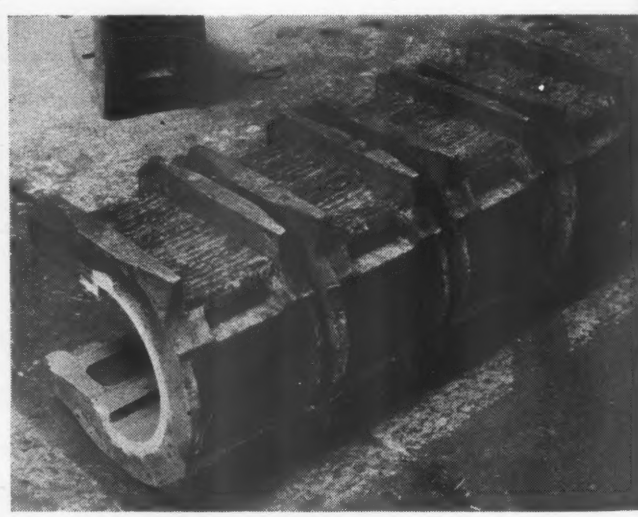
The most important application of this rod is on building up worn driving-box laterals. Excessive locomotive maintenance costs which result from lateral motion may be eliminated since the weld-deposited liner cannot come loose and restoration involves merely replacement of the few pounds of metal which have worn away. It is never necessary to replace the entire bearing as in the case of poured-on laterals and this permits a large reduction in the tonnage of critical brass that it is necessary to keep in stock for such repairs.

On old boxes the dovetail space may first be filled with a ring-shaped steel plate welded in as a space filler, upon which a 3/8-in. to 1/2-in. bronze overlay is deposited. Or, the cavity can be completely filled with either steel or bronze weld metal building up finally to the desired height with bronze. In any case the best results are obtained with the crown brass removed before applying the lateral. New driving boxes can be made without the customary dovetail space and the liner is then deposited directly upon the surface. A metal form made of 1 1/4-in. by 1/8-in. band iron tack welded in place to confine the weld to the required shape can be used in applying the bronze. A dam of wet asbestos can also be used for this purpose.

The bronze can be applied by either the metallic arc or the carbon arc. In either case it is important that the current be adjusted to assure good penetration because to insure positive adherence it is essential to obtain partial fusion of the bronze to the steel base metal. However, assimilation of the steel into the bronze must not be allowed to go so far as to create hard spots at the surface as this would cause scoring of the locomotive wheel centers. The deposit should be as smooth and regular as possible to avoid pits or depressions after machining.

To compensate for the mixing of steel with bronze on new boxes the latter may be built up 1/16 or 1/8 in. above normal height. Another method is to undercut the steel surface about 1/8 in. before making the deposit. Otherwise, no preparation is required on new boxes, since only a clean surface is necessary to receive the overlay.

The reclamation or replacement of crown brasses offers another application for the bronze. If the brass is not loose in the box it can be built up in position. Usually, however, it is removed and placed on a simple rotating



Driving boxes built up with a bronze electrode are shown as they appear before machining

positioner. Weld metal is then deposited on the back and face of the crown, for a distance of four to five in. from the toe edges.

Several railroads have experimented successfully with eliminating the separate crown brass entirely. In this method a formed section of plate is welded into the crown space to fill some of the space required by the conventional crown brass. Several steel strips 1 in. wide and 5/8 in. thick are then arc welded to this plate to help prevent pounding out of the bronze weld metal which is deposited over and around the strips. This deposit is built up sufficiently to allow for a 3/8-in. depth above the strips in the crown and 1/4 in. at sides, after machining.

* Abstracted from a part of a paper delivered before the railroad welding session of the American Welding Society at Chicago, October 18, 1943. Another article deals with the portion of the paper on the use of steel electrodes.

† Superintendent railroad service, Western Division, Air Reduction Sales Co., Chicago.

If this operation proves fully acceptable it will effect a considerable saving of brass and labor time. It is probably best suited to switch-engine driving boxes.

The lead-bronze bearing metal is also applied on driving-box shoes and wedges. This operation can be performed on parts made of cast steel, cast iron, bronze, or parts fabricated by arc welding. On cast parts a small-size rod should be used to prevent warping. If desired, the bronze facing can be applied to the shoe and wedge side of the driving box itself. No special preparation is necessary if the surface is clean. As in the case of laterals, when the worn box is removed from service for resurfacing it is only necessary to add sufficient bronze to restore it to proper size. Very good results have been obtained with fabricated crosshead shoes surfaced with bronze. Rods of small size are used to avoid warping.

Babbitting Engine-Truck Boxes

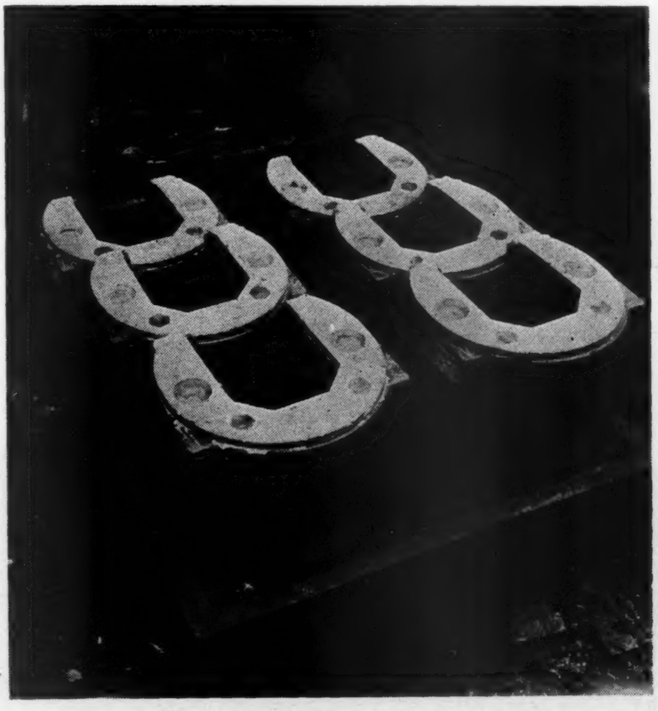
A widely used method of babbitting engine-truck boxes for the side-bearing consists of applying metal forms around the outer periphery and the journal opening on one side, fire clay being used to make the forms a tight fit on the face of the box which is poured with babbitt to the top of the forms. The box is then moved to a boring mill and the babbitt faced off to the proper thickness, incidentally removing the somewhat chilled outer surface which has the best wearing properties. A second machine operation is something required to drill shallow holes in the babbitt for grease receptacles.

Babbitting jig ready to be applied to an engine-truck box

This babbitting work is usually done with the boxes resting on the floor of the babbitt shop and involves a large amount of manual labor with more or less heavy lifting and pulling. A study of the job at the South Louisville shops of the Louisville & Nashville somewhat over a year ago, showed an average production of 15 to 18 babbitted engine-truck boxes by one mechanic and two helpers in an 8-hr. day, and it was decided to see what could be done to improve the operation. As a result of supporting the boxes on sheet-iron tables so all work can be done in a standing position, the process moving continuously from left to right with the assistance of a swing hoist, and using a metal babbitting jig which molds the babbitt to the correct thickness (with grease receptacles cast in place), the production of babbitted engine truck boxes has been stepped up to about 32 a day and all delay and cost for subsequent machining has been eliminated.

With the engine-truck box inverted babbitt is poured in both toes of the mold simultaneously

Referring to the illustrations, it will be noted that the engine-truck babbitting jig consists of a heavy steel plate, positioned on the face of the box by an extension plate which fits the journal. The plate is recessed to give the



Six engine-truck boxes with babbitt side bearings accurately molded in place

required babbitt thickness and grease receptacles. The outer edges of the jig are an accurate fit on the face of the box and, when drawn firmly against it by means of the large through-bolt, the joint is made tight against melted babbitt leakage without the use of fire clay.

Babbitt is poured simultaneously into each "toe" of the mold while the box is in the upside-down position, as illustrated. This assures a uniform solid babbitt side plate which is free from any possibilities of air holes or metal segregation. On completion of the babbitting operation, the engine-truck boxes slide down a chute onto a waiting skid on which they can be readily moved to the erecting shop or storeroom.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Welded Flues Which Crack Through the Bead

Q.—We have considerable trouble with the boiler flues cracking through the bead even though the beads are welded to the tube sheet. How can this trouble be overcome?—F. I. M.

A.—The cause of flue beads cracking in service is the fact that the bead is welded to the sheet by the fusion-weld method, and the flue bead is restricted in its normal movement in addition to absorbing the shocks from expansion and contraction and the working in application. It necessarily follows that the cracks appear in direct proportion to the amount of care or the lack of care given in the preparation and application of the flue or tube originally. The 1940 proceedings of the Master Boiler Makers' Association lists ten recommendations for the proper application and care of boiler flues: (1) Select material to known specifications; (2) hold the working of material to a minimum; (3) remove all mill scale and foreign material from fire end of flue and sheet; (4) do not use excess material in gauge or projection; (5) use proper tools for setting; (6) know that all grease, soap or dirt is removed where weld is to be applied; (7) use the minimum heat and smallest practical electrode for welding; (8) use feedwater treatment when necessary to keep flues and sheets free from scale; (9) if flues indicate loosening at setting or develop minor leaks, tighten with a suitable expander; and (10) have welding done by a practical operator under competent supervision.

Avoiding Use of Oversize Rivets In Poorly Prepared Sheets

Q.—In lining up two sheets, which have been punched for riveting, rivet holes are often found to be poorly matched. How can this condition be overcome without reaming for oversize rivets?—M. I. D.

A.—In most cases this trouble can be overcome by reaming the holes at an angle, holding the reamer so that it will pass through the center of the hole in each sheet. Care should be taken in riveting, to drive the rivets with the rivet snap and bucking bar held directly in line with the body of the rivet until it is fully upset and completely fills the rivet hole. This snap and bucking bar should then be held at right angles to the sheet for a few strokes while finishing the rivet head.

A Well-Lighted Locomotive Wash Track

The Illinois Central has recently constructed and placed in service new locomotive wash track facilities at its Twenty-seventh street, Chicago, engine terminal which enables this work to be done under much better conditions than formerly, with attendant improvement in quality of the work and reduction in the time taken to do it. The actual time required to put a locomotive over the wash track, as now equipped, varies with its size and type, but an average size steam locomotive can be thoroughly washed and wiped, where necessary, by one man in about 60 minutes, 30 minutes for the locomotive and 30 minutes for the tender.

The principal feature of the new Illinois Central wash track is the complete facilities for drainage and

Locomotive wash track on the Illinois Central at the Twenty-Seventh street, enginehouse, Chicago

Two Mercury-Vapor lights at one end of the wash track

the provision of relatively dry and firm footing for the washing crew under all conditions. Hot water and cleaning oil are, of course, piped to the wash track where suitable lengths of hose and a wash gun are provided on each side of the locomotive.

Referring to the first view, with Locomotive 1143 in the distance, the general construction of wash track will be evident. It is about 100 ft. long with a shallow concrete pit sloping towards the center from each end and for drainage. A wooden platform, about 6 ft. wide on each side of the track, is designed to give secure footing and the longitudinal boards or planks

Along each side of the track is a wood side platform and rack for supporting the wash gun

are spaced so that wash water can readily pass through and drop to a concrete base which slopes towards each rail and delivers water through rectangular openings to the main pit. The center of the main pit is connected to a sump which can be cleaned out periodically, excess water and soluble matter flowing to the city sewer.

A 150-gal. reservoir, suitably mounted at one side of the wash track is usually filled a little more than two-thirds full with two barrels, or 110 gal. of D. & M. oil which functions to cut the grease and leave the washed surfaces of the locomotive with a noticeable

One of the adjustable 400-watt mercury-vapor lights

shine, or lustre. Air pressure is supplied to the oil reservoir through a feed valve set at about 10 lb. and the reservoir also carries a gauge and a pressure relief valve.

Hot water is piped to the wash track from the powerhouse, a booster pump being used to raise the pressure to about 120 lb. The temperature of this water is about 120 deg. F. Both D. & M. oil and hot water pipe lines are brought up on each side of the wash track near the center where connections are made to the two lengths of washing hose and the Holmquist Red washing guns. Two neat wooden racks or horses are provided, as illustrated, to hold these guns and avoid the possibility of their being thrown on the ground and damaged by breaking the operating levers or in any other way. Each gun has a water cut-off valve and one lever controlling the supply of D. & M. oil.

In washing a locomotive, the washing gun does the entire job on the locomotive proper with no subsequent hand wiping required except under certain conditions

on the upper jacket. For a thorough job on the tank, Oakite No. 70 is applied with a brush and subsequently hosed off with plain water leaving the tank exterior surfaces clean and shiny.

Four 400-watt high-intensity mercury vapor lights permit the washing to be done effectively at night and also in dark or stormy weather. The lighting units are Westinghouse floodlights mounted as shown on pipe supports, eleven feet above the base of the rail. The fixtures each include a mounting bracket and transformer. There are two units for each side of the locomotive, mounted 25 ft. out from the center line of the track. The longitudinal spacing is 65 ft. The units at the head end are aimed so that the center of the beam strikes the side of the locomotive at an angle of 60 deg. The rear lamps are turned to strike the side of the locomotive at 30 deg. The light is thus somewhat greater on the motion work than elsewhere, and due to the fact that is comes from both ends at different angles it is effective in lighting all surfaces on the locomotive.

Grooved Rolls Speed Up Bending Work

Sheet metal operations have been speeded up at the General Electric Company's Schenectady Plant through the use of grooves in a standard six-foot bending roll. The grooved rolls, shown in the accompanying photograph, in combination with the use of spot welding instead of arc welding, have reduced the time required to produce such products as end shields, ventilating hoods, and covers for motor-generators and turbines.

Grooved rolls for welded assemblies

The spacing of the grooves provide certain combinations of channel and Z sections. Flat sheets are sheared to proper length and developed width, and the edges are then bent in a standard bending brake to form either a channel or Z. Next, the two ends of the piece are formed in a brake to the contour of the desired part. Then the piece is inserted into the grooves of the roll, and by applying pressure to the top roll the section is rolled to the desired contour. This rolled section takes the place of a Z section formerly made from either two or three pieces arc welded together.

The rolled section is then routed to a spot welder where it is spot welded to flat side sheets. The use of spot welding produces neater work in less time and at lower cost.

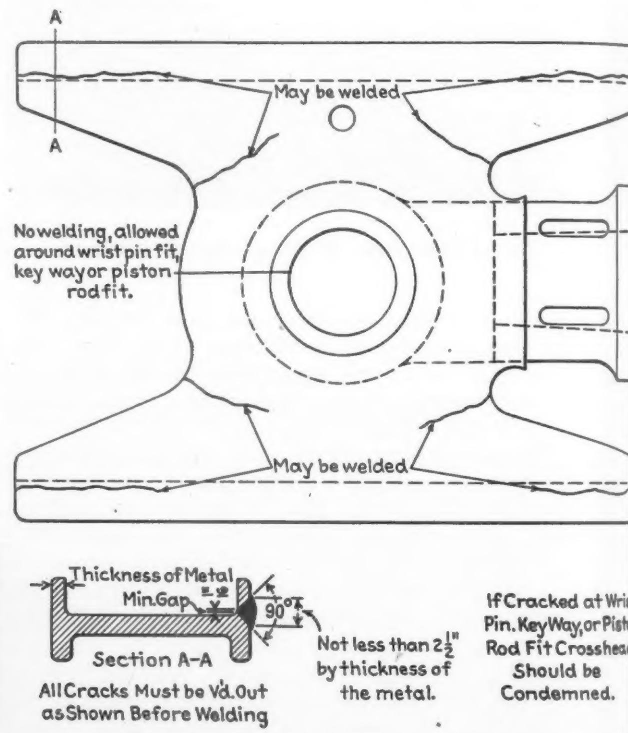
Questions and Answers On Welding Practices

(The material in this department is for the assistance of those who are interested in, or wish help on problems relating to welding practices as applied to locomotive and car maintenance. The department is open to any person who cares to submit problems for solution. All communications should bear the name and address of the writer, whose identity will not be disclosed when request is made to that effect.)

Welding on Crossheads

Q.—What are the limitations on welding cracked or damaged crossheads? Can you suggest a shop standard to be followed?

A.—Welding of cracked or damaged crossheads is permitted on practically all roads with the only limitation



Cracked and damaged crossheads can be reclaimed by welding but certain areas may not be welded

being that no welding is allowed around the wrist-pin fit the keyway or the piston-rod fit. In addition, the building up of worn surfaces is allowed and complete crossheads have been satisfactorily fabricated by welding. The accompanying illustration is taken from the shop practice manual of a road which has, for many years, reclaimed crossheads which were cracked.

Reducing Welding Stresses

Q.—We find in examining some of our welding work that there is evidence of stresses set up, particularly in heavy sections, by our methods. Is it possible to eliminate them?

A.—Noticeable stresses are inherent in all welds but especially in those in heavy sections. They can be reduced by permitting a slight movement of the parts being joined during the welding operations. The use of a properly selected electrode which allows the needed weld to be made in as few passes as possible is also recommended. Peening each deposit tends to reduce stresses. When the weld is completed, stresses are further relieved by annealing the finished piece at a temperature of 1,100-1,200 deg. F. Allow one hour in the furnace for each inch of thickness.

With the Car Foremen and Inspectors

Making Large Stencils

The large Santa Fe stencil, illustrated, is 12½ ft. long by 6 ft. high for 40-ft. cars and 17 ft. long by 7 ft. high for 50-ft. cars, carrying the Santa Fe map and slogan and being made at present of heavy stencil paper framed in poplar wood. The letters and design of this sign are powerful and legible, with thick stems and well-proportioned letters in lower case, except where capitals are necessary, or italics for the purpose of emphasis.

All Santa Fe refrigerator cars have orange-yellow body paint, with signs in black enamel which give a combination easily read at a distance. The box and automobile cars, with red body paint, have signs applied in white mineral paint which is also a good combination for visibility and contrast.

In making the stencil, a full-size paper pattern is laid out on the stencil paper and the letters and route marking cut out with a machine which permits doing this job quickly and accurately. As a matter of fact several stencils can be cut out at the same time by this method. The letters are tied in and the surface of the stencil stiffened by taut piano wires passing from side to side of the wood frame. The stencil is processed with linseed oil and two coats of clear lacquer and the piano wires are held to the stencil paper by a special cement. This method of making a stencil has the advantage of lightness and costs one-quarter as much as a zinc stencil, providing the zinc could be procured.

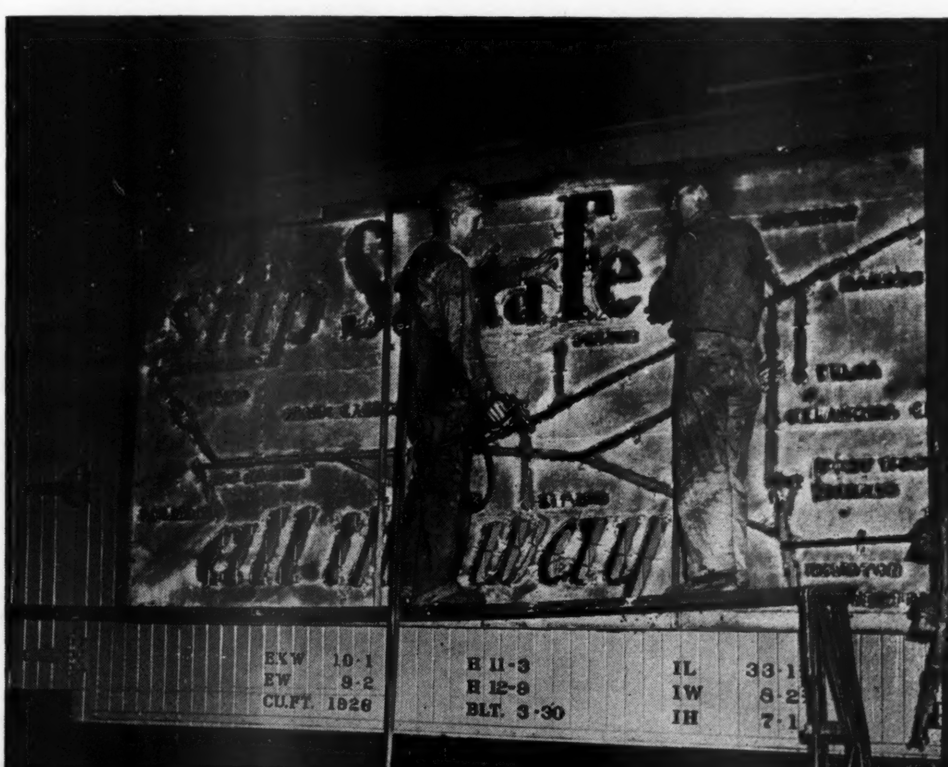
The stencil is applied to the car side in a few minutes by the use of suitable brackets and hangars which hold it in the proper position ready for spraying on the paint by means of the special spray gun and hose connections, illustrated. The service life secured with paper stencils like the one shown is admittedly much less than that of a good zinc stencil, but with reasonable care in handling and cleaning they give satisfactory service for a considerable period and have the added advantage of lightweight and relatively low cost.

Hot Boxes Caused by Wedges

By T. S. Cheadle*

The photographs which appear with this story show hollow and depressed-back journal box wedges which were removed on 72 miles of railroad within a period of 15 consecutive days. All cars from which they were removed had been set off because of hot boxes. I believe that hollow and depressed back journal box wedges, even when they are not condemnable by the present specified A. A. R. measurements, contribute more than anything else to hot boxes and that their use should be prohibited. It is true that only the car owner can use them under

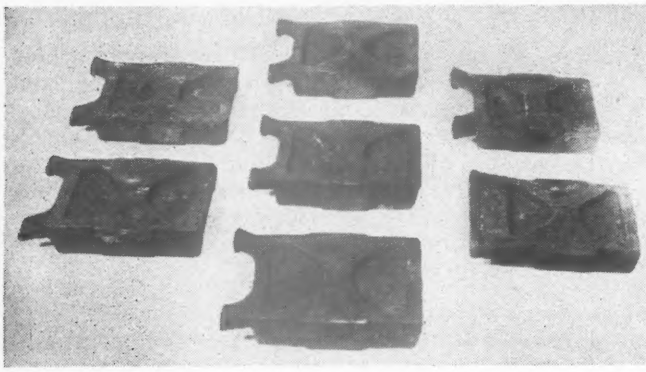
* Chief car inspector, Richmond, Fredericksburg & Potomac, Fredericksburg, Va.



Santa Fe stencil made of heavy stencil paper reinforced with piano wires stretched taut between the sides of the wood frame

present A. A. R. rules but when wheeling cars or at repacking times they cannot be replaced at car owner's expense unless they are condemnable under the rules.

The check which disclosed this condition was not conducted primarily to study the frequency of failures in boxes having this type of wedge but to learn whether



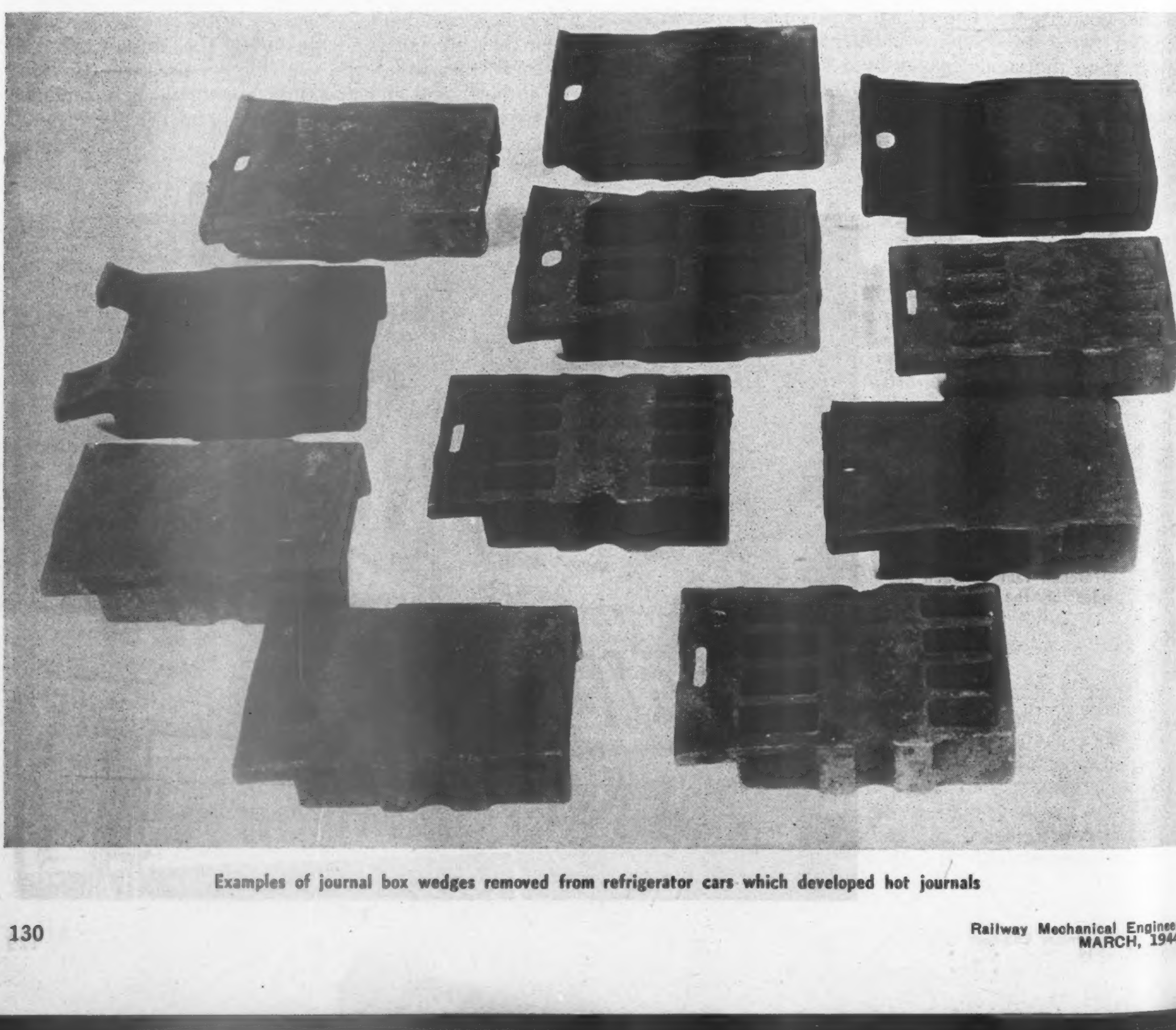
Some railroad-owned cars are still equipped with hollow and depressed-back journal box wedges—The examples shown were removed from cars set out because of hot boxes

car inspectors were using proper judgment in the inspection of wedges. It did develop, however, that 11 hot boxes on privately-owned refrigerator cars out of 22 occurring during the period were in boxes having these wedges. An estimate of the number of refrigerator cars equipped with hollow or depressed back journal box wedges would be one per cent. Of 21 hat boxes on railroad-owned equipment 7 were found in boxes having the hollow or depressed type back. I estimate that not over one half of one per cent of railroad-owned cars use these backs. These figures indicate that the frequency of set-outs on cars equipped with these wedges is out of all proportion to the number of such cars in service.

Rider Cars

Since new passenger equipment has become unavailable the New York Central has placed in service every coach of company ownership which could be made suitable for regular passenger traffic. The latest cars so taken from other assignments are 20 train crew cars which had been used on express and milk train runs. These were replaced with rider cars built at the East Buffalo car shop, Buffalo, N. Y. Steel underframes removed from 36-ft. cars with wooden superstructures were reinforced and extended at the ends to provide for end platforms and steps. The house portion of the car followed a general box-car pattern with side doors eliminated and windows provided in the sides for light and ventilation. Interior side walls and ceilings are plywood, varnished in natural color.

Interior equipment consists of a conductor's desk, walk-over type seats, clothes and supply lockers, a lavatory, a mantel-type lamp, fire extinguishers and a stretcher. A caboose stove is installed for use when the car is operating in mixed trains, ordinarily they are



Examples of journal box wedges removed from refrigerator cars which developed hot journals

Interior of a New York Central rider car—Side walls and ceiling are of plywood

heated by steam. The cars are considerably heavier than the cabooses which they somewhat resemble and they are equipped with passenger-type trucks for high-speed service.

Air Brake Questions and Answers

Installation and Maintenance of Axle Generators

230 (Continued)—*Q.—Give the duties of these parts.* A.—The F-1 automatic control switch is a pneumatic switch which is operated during emergency and safety control brake applications to open the control circuits and throttle the engines. The condenser unit is used in connection with electric braking circuits to protect electric contacts of the master controller from excess arcing. Two duplex air gauges are used on the locomotive to indicate air pressures in the main reservoirs, brake pipe, equalizing reservoir and brake cylinders and a single pointer gauge is located near the compressor governor to indicate the main reservoir pressure and facilitate adjustment of the governor. A ½-in. by ½-in. double cut-out cock, located beneath the S-40-C independent brake valve is used to cut out the independent locomotive brake when double heading. The B-3-A conductor's valve, attached to a branch of the brake pipe is used to permit the application of brakes by other than the engineman in an emergency and the signal valve and whistle, the C-1-3-6 strainer and check valve and car discharge valve are parts of the conventional train signal system.

231—*Q.—With what is the auxiliary B power unit equipped?* A.—The same devices as the A power unit with the exception of the control devices M-S-40 brake valve, S-40-C independent brake valve and foot valve.

232—*Q.—How, then, does this unit operate?* A.—In the train with the A unit from which its brakes are controlled.

233—*Q.—Can the brakes on this unit be controlled when detached from the A unit?* A.—Yes. An S-5-A hostler brake valve is supplied, which permits the control of the brakes on the B unit when detached from the A unit and moving under its own power to a siding or enginehouse.

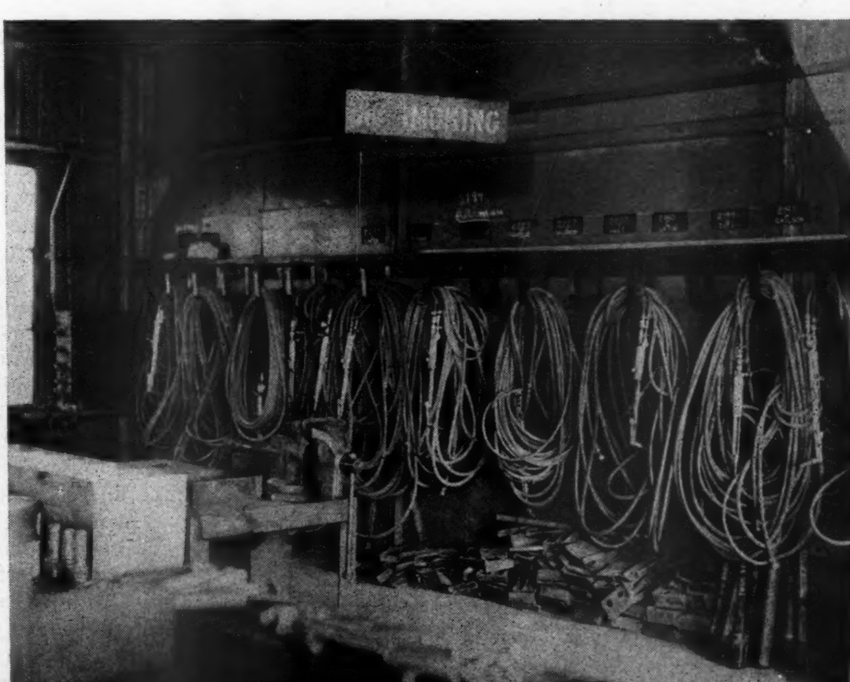
234—*Q.—How many lines of piping extend the length of these units?* A.—Six.

235—*Q.—What are these pipe lines designated?* A.—Straight air pipe, brake pipe, signal pipe, independent application and release pipe, actuating pipe and main reservoir pipe.

236—*Q.—How are the connections made?* A.—By armored hose with couplings, fittings and double locking cut-out cocks.

237—*Q.—Describe the functioning of these connections in service.* A.—Front end connections on the A units permit training from this end. On both ends of the B units and on the rear end of the A units, the main reservoir, independent application and release pipe and actuating pipe have duplex connections to both sides

* * *



To keep things straightened out among the acetylene welders at an Eastern car repair yard the torch and hose equipment is assigned to an individual workman and a place provided to hang it up at the end of the day's work—The man's name appears on the card over the hook on which the hose is hung

of the coupler to permit coupling of units back to back. The duplex couplings as thus supplied on A and B units permit the coupling of any multiple combination of power units which do not have duplex connections.

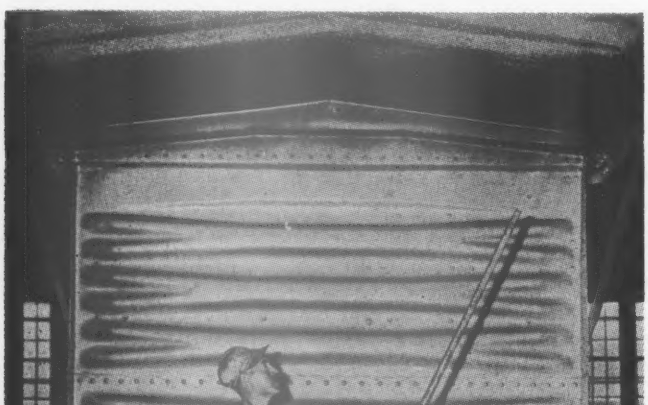
Description of the Parts

238—*Q.—What determines whether the MS-40 brake valve is in position for HSC electro-pneumatic or automatic-pneumatic operation?* A.—The position of the brake valve shifter lever conditions the brake valve for either of these two operations.

239—*Q.—How many positions has this lever?* A.—Two. These positions are 180 deg. apart horizontally, each being located by a hole in the brake valve body casting into which a handle stop pin engages and locks the shifter lever in position.

Device For Spraying Mineral Slag

Refrigerator cars of the Atchison, Topeka & Santa Fe are built new and repaired largely at the Wichita, Kans., shops of this road where the spraying operation, shown in the illustrations, was performed. To provide some degree of insulation and protection against condensation, the interior steel surfaces of refrigerator car sides, ends and roofs are sprayed with an asphaltum base material which, before it sets, is also sprayed with slate granules or mineral slag, the operation illustrated.



Spraying mineral slag on the underside of a Santa Fe car roof

The special spray equipment consists of an electrically driven centrifugal fan which supplies air at relatively low pressure to a long pipe nozzle through a light flexible hose. The nozzle is equipped with a box which contains the mineral slag and has a small pipe connection near the bottom so that mineral slag is syphoned into the air stream and blown on to the underside of the car roof or other metal surface as desired. Both the spray nozzle and slag box and the motor-driven fan are suspended by straps from the operators' shoulders, so the equipment is easily portable. It is also light in weight and hence does not tend to tire the operator.

Pullman-Standard Labor Saving Suggestions

The suggestion plan, now being followed by the Pullman-Standard Car Manufacturing Company, has been in effect for 21 years and is designed to encourage all employees to make suggestions regarding changes in shop procedure or devices which they think will give greater safety or make the work easier. The effectiveness of this plan is shown by the fact that, in the nine plants operated by this company, a total of 615 usable suggestions were made and awards granted in the three-month period from June 1 to September 1, 1943.

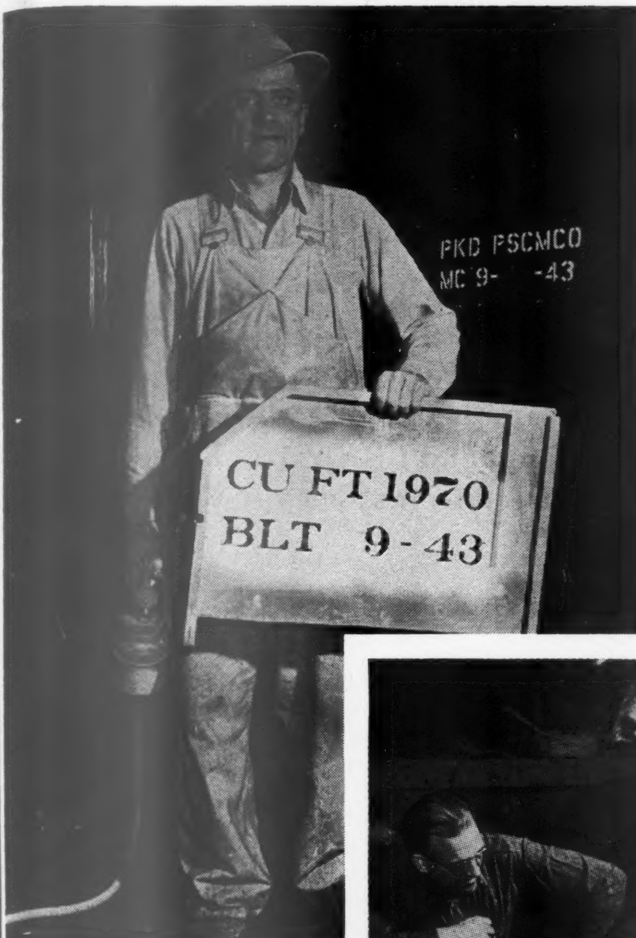
While most of the suggestions advanced at the present time undoubtedly pertain more or less to the manufacture of war materials, five ideas having a definite bearing on car-shop work are illustrated on the opposite page. For example, the upper left view illustrates a stencil designed to have unusually good wearing properties. It is made of two layers of paper with the supporting wires located between, thus facilitating cleaning the stencil and preventing wire damage. Although this stencil costs slightly more to make, its advantages include long life and the saving of time formerly required in retouching.

The upper right view shows a suggested clamping device used in picking up acetylene cylinders at the receiving station or wherever they have to be handled in quantities. The recessed head of the cylinder provides a good grip for an expanding pair of legs. When lifted by a hoist, this device solidly grips the outer rim of the cylinder.

Magnaflux powder is in great demand at most railway car shops as well as locomotive shops for magnetic testing purposes. Obviously, every practicable means of conserving this powder and making it available for continued re-use should be adopted. The center illustration shows how this is done at one Pullman-Standard plant. Provision is made to catch all excess powder at the testing table which is then placed in the hopper of the machine illustrated for cleaning. The hopper is connected to a cylindrical fine-screen drum revolved by an air motor and arranged to screen out all foreign particles which drop out into one floor pan as the clean Magnaflux powder falls into the other. This device saves many pounds of Magnaflux powder which would otherwise be wasted.

All cars require more or less work by pipe fitters and the lower left illustration shows a good time-saver in the work of applying pipe unions. It consists of a ratchet wrench equipped with two studs which fit into bolt holes in the union. The application of unions and running of pipe lines is materially speeded up by use of this device.

The lower right illustration shows one-half of a special clamp used in connection with the shop crane for loading army car underframes into gondolas for foreign service. This loading bar enables the underframes to be lifted with the edges down and loaded in a vertical position in the gondola where several are tied together and handled as a unit load.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Train Telephone Communication

By W. R. Triem†

Telephone system employed by the Pennsylvania Railroad provides continuous communication between trains, between front and rear of trains, and between trains and wayside towers

A freight train conductor calls his engine crew on the train telephone—The conversation is also heard clearly by the block operator miles away—He can converse, as well, with the crews of other trains

A LONG felt need for a means of communication between trains, whether moving or standing, and between trains and wayside stations is believed to have been met in the train telephone system being given trials on the Belvidere branch of the New York Division of the Pennsylvania Railroad. This telephone system is the result of joint development by the Pennsylvania and other railroads with the Union Switch & Signal Company over a period of several years. Since the earliest days of experimentation with radio, the railroads and manufacturers of electrical equipment have been attempting to solve the problem of providing reliable communication on and between railroad trains and wayside stations.

This innovation is the latest of a long list of improvements developed by the Pennsylvania and other railroads in cooperation with various electrical manufacturers to expedite train movements and afford better service for the public. Discoveries and developments in the field of electronics have been utilized by the railroads in numerous ways, and constant research is under way to find means of further increasing the efficiency of railroad operations. Among more recent contributions in the field of electrical and electronic developments are centralized traffic control, dragging equipment detectors, cab signals, radio-telephone tugboat dispatching, telephone announcing systems in yards and stations, yard engine telephone systems, Magnaflux method of examination of axles for cracks, Sperry apparatus for detecting flaws in rails, and the like.

Among these, an outstanding contribution to train operation is the cab signal, by means of which a signal is displayed in the cab of an engine reproducing wayside signal indications and keeping the engineman constantly advised of the conditions on the track ahead of his train. In the development of this cab signal system it was found that a further extension of the application of electronics to railroad operation was possible, to provide a means of communication between moving trains and between moving trains and wayside stations.

The train telephone in use on the Pennsylvania Railroad today is a result of these studies. Actually, it is neither radio nor telephone. It incorporates certain

The bar of metal shown below the cylinder is an end of the receiving coil—The equipment box may be seen above the cylinder

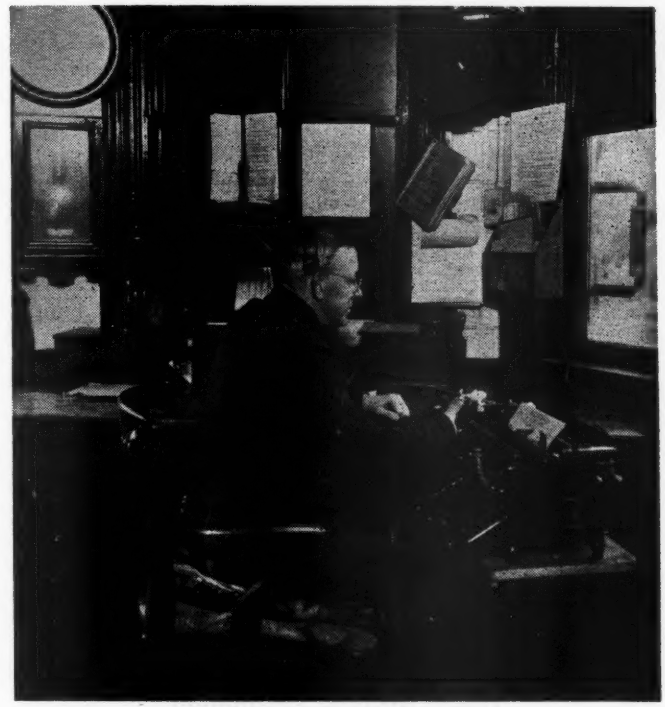
† General superintendent of telegraph, Pennsylvania.

features of both types of equipment and eliminates other features of both systems. So far as radio is concerned, it must be remembered that essentially, communications by radio are broadcast to all suitably tuned receiving sets within transmission distances through ground and atmosphere; i. e., through transmission paths universally provided by nature. Radio would possibly fulfill the requirements of communication between moving trains and between moving trains and wayside stations if it were not necessary to share with others the privilege of the air and conform to Federal rules and regulations so essential to the maintenance of order under crowded and competitive conditions. On the other hand, wire telephony does not fulfill all of the requirements of communication between moving trains and wayside stations for the reason it is confined to definite wire transmission paths from the transmitter to the receiver.

The train telephone system in use by the Pennsylvania on the Belvidere branch combines certain features of radio and wire telephony, utilizing the constant contact with moving vehicles possible by radio and at the same time restricting the transmission paths to railroad property. Railroad vehicles invariably use track rails which extend to all areas requiring communication with moving equipment. Thus the rails offer a most desirable communication transmission path. The rails, together with adjacent communication pole lines, are utilized for the transmission paths and the electronic equipment, electron tubes, condensers, coils, and the like, on engines, cabin cars and wayside stations provide the means of utilizing radio principles in maintaining the constant communication contact so essential to the success of the scheme.

Experimental installation of the Union Train Communication System on the Belvidere branch was authorized in September 1941, and in June 1942 an engine and cabin car had been equipped, wayside appliances in-

Eastern lines of the Pennsylvania showing the section equipped with the train telephone communication system



The block operator uses the train telephone to call the crew of a freight train miles away, to give them operating instructions—He carries on a two-way conversation with both the conductor and the engineman—The loud speaker above the operator enables him to hear conversations between the locomotive and train crews of all trains operating on the branch

stalled and placed in service. To date ten engines, and ten cabin cars and one block station have been equipped and an additional block station will soon be in service.

It is a carrier telephone system using the upper side band of a 5,700 cycle carrier for transmitting calling signals and voice. The carrier current is fed conductively into the rails, picked up inductively from the rails and induced in the wires of the communication line adjacent to the track. It is carried through the rails and line wires between front and rear ends of trains, from one train to another train and to wayside stations by direct wire connections in the vicinity of the station.

At the sending telephone on the engine and cabin car, a circuit is provided by a loop from an insulated truck to adjacent truck via the rails, and a current at carrier frequency is sent out along the rails and adjacent line wires with the return path through the ground. The impedance drop in the rails between the insulated truck and adjacent truck causes the transmitting rail voltage. Receivers pick up the energy which is transmitted through induction coils in proximity of the rails and is amplified and demodulated for reception in the loud speakers and handset telephones.

At the station, the output or transmitting connections from the set, when talking or signaling, are made to a simplex leg of a block line and to the rail system, the circuit being completed by the capacity coupling between the block line and the rails the length of the branch. The receiving connections at the station are made to the track rails at points about 150 ft. apart, the impedance drop of which provides the energy which is amplified and demodulated for reception. There is no interference in operation between this system and radio, telephone or signaling systems.

Train Equipment

The engine and cabin car equipment consists of a

weather proof instrument shelter containing electron tubes, condensers, coils, dynamotor, fuses, etc.; a source of power supply; an output transformer; two receiving coils; a loud-speaker; a control box; necessary wiring and conduit.

The equipment box or instrument shelter on the engine is located on the running board near the front end, the output transformer is in front of and below the smoke-box, the receiving coils are about 4 in. above top of each rail and located between the engine truck and front drivers, the loud-speaker is in roof of cab above engineman, the control box with calling button, indication lamps, volume control and handset is in cab above and in front of engineman.

The equipment box and storage battery in the cabin car are under one of the seats; the output transformer is under the cabin car about midway between the trucks; the receiving coils are about 4 in. above top of each rail between the trucks; loud-speaker is in the cupola; control box with calling button, indication lamps, volume control and handset are on a partition of the car. The removable equipment trays in the equipment boxes on engine and cabin car are interchangeable. The electron tubes are the same as those used for telephone, radio and other purposes.

Block Station Equipment

The block station equipment consists of a metal cabinet which houses the electron tubes, coils, condensers, rectifier, transformers, etc., for signaling, transmission and reception; a desk stand microphone with calling button and lamp indicator in base and a head band receiver; foot switch for transmission; loud speaker with volume control for reception of calling signals and conversation.

Train telephone wayside equipment cabinet for the Pennsylvania's Belvidere branch, installed in the station at Frenchtown, N. J.

When head band receiver is being used, the loud speaker is cut out. The set is normally in receiving condition when turned on.

Power Supply

The power required is about 150 watts for receiving and a maximum of about 550 watts for signaling and talking. It is furnished on the engine by the headlight generator, on the cabin car by storage batteries, and at the block station from commercial 110 volt 60 cycle supply.

Track Bonding

It was found desirable, for the most satisfactory operation, to provide one bonded rail of the main track and to install resistance shunts around all insulated joints.

Truck Insulation

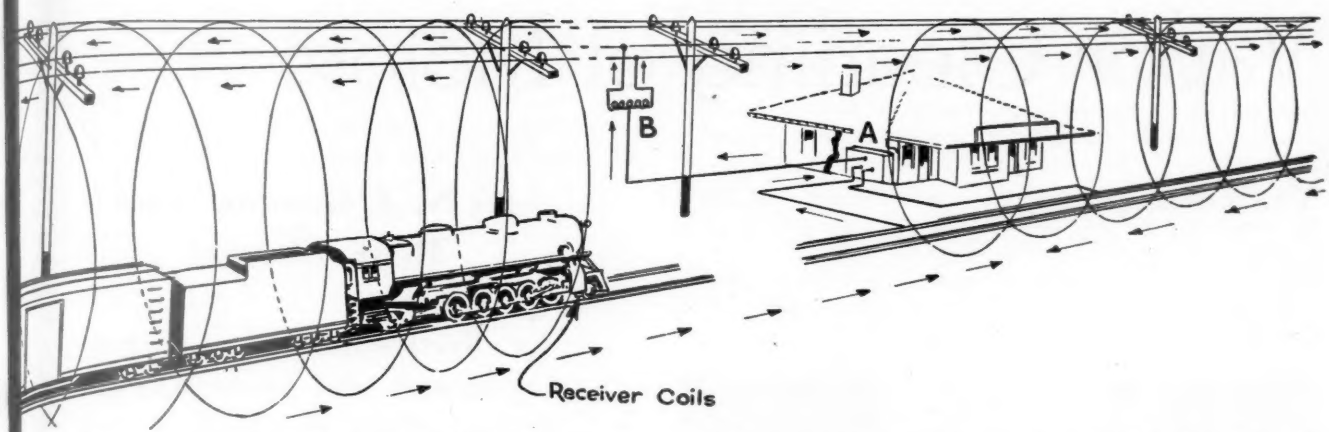
Insulation of cabin car trucks essential for operation of the telephone system on cabin cars was found to present little difficulty. A design was developed employing ⅛-in. hard fibre to withstand moisture so placed that no wearing or rubbing surfaces are in contact with the fibre and effectively separating all metal parts through which current could pass from the frame of the cabin car to the wheels to which the transmitting circuit was connected. Insulation of wheels of engines was found to present varying problems for different types of engines; on the mikado type used on the Belvidere branch, the front engine truck was found to be most adaptable for insulation as has been the case with other types of freight engines studied.

Use of the Telephone System in Regular Service

The map shows the portion of the Belvidere branch on which the train telephone is regularly used, namely Trenton to Phillipsburg, a distance of about 50 miles. Equipped engines and cabin cars entering the territory at Phillipsburg and at Trenton are tested by the engineman and conductor in conversation with each other and with the operator at Frenchtown. The telephone equipment on engines and cabin cars is kept turned on continuously between these two points. When the telephone is to be used, a calling signal is first sent out by means of a push button on the control panel which causes an audible signal to sound in loud speakers of receiving sets at the wayside station and on engines and cabin cars within a radius of operation. The person calling, then broadcasts the name of the station or the number of the engine of the train, and whether engine or cabin car is being called, until response is received and telephone communication established. The telephone conversation between two units is simultaneously transmitted through loud speakers of other units within the radius of operation, any one of which can break into the conversation by calling signal and voice broadcast, should necessity arise.

The range of communication between engines and cabin cars of one train with those of another train has been kept within relatively short distances. Good transmission is provided for distances up to about 4 miles, beyond that distance neither safety nor efficiency of operation would be served, in fact it would unnecessarily load the telephones with undesired conversations. Communication between two trains, irrespective of distance, is always possible by relay of messages through the operator at Frenchtown who can communicate with trains anywhere within the territory.

Experience with the daily use of the system on the Belvidere Branch has shown numerous advantages, in movements of trains, by reason of the close contact



Vhen the operator at a wayside station is talking to a moving train, current from the transmitter *A*, located in the station, flows through he impedance coil *B* and into the telephone circuit, dividing equally between the two lines and returns by capacity coupling through he ground—When the operator is talking, a current is continuously induced in the running rails of the track—This induced current is icked up from the rails by the receiver coils mounted on the locomotive and on the cabin car—This current is then amplified and trans- ated into voice reception—When a member of the train crew is talking to the office, he applies local current to the track which induces urrent in the line wire over which it is transmitted to the station.

Communication between office and train

vhich is constantly available between the train employes n the front and rear of trains and between them and he operator at Frenchtown.

The operator finds out by telephone from the engine- nan and conductor just what is occurring in their move- nents, keeps the train dispatcher fully advised and thus ermits accurate planning of all train movements af- ected. When anything unusual happens all persons in- erested are promptly advised and advantages are taken n the instant, reducing delays which otherwise would ccur if wayside telephones had to be used for reporting he circumstances.

Communication between the engineman and conductor ncidental to the movements of their train has been found o improve operations and reduce delays; starting and topping, switching, setting off and picking up cars, test- ng air brakes, taking water and coal, handling equipment ecoming defective enroute, and many other matters ffecting the prompt movement of trains are subjects f telephone conversations carried on daily by the train elephone system.

With traffic density of 10 to 12 through freight trains nd 4 passenger trains daily, the installation of automatic lock signals has not been found necessary on this line. Since the early days of railroading trains on the Belvi- lere Branch have always been carefully protected by he particularly restrictive form of manual block system tandard on the Pennsylvania. With the inauguration f the train telephone great benefit has been derived n safely handling trains under this manual block system s would be true under any signal system. In fact, the onstant contact between trains and the block operator t Frenchtown permits of movements complying with ll of the restrictions of the manual block system to be nade almost as advantageously as though automatic lock signals were in use. Conductors on trains entering idings or clearing a block previously occupied, use the rain telephone to advise the operator; operators use the rain telephone to tell the engineman the train may enter nain track from siding or enter a block and whether he block is occupied by another freight train. (Oppos- ng trains or a passenger and a freight train, either op- osing or following, is prohibited in the same block.) t frequently happens that a freight train enters a manual lock under permissive signal only a short time before train ahead clears the block at the other end; with the train telephone the operator is able to call the engineman of the following train and tell him the block is then clear, thus permitting the train to proceed safely at increased speed.

It has been said a railroad signal system is merely a means of communication; the train telephone gives promise of becoming a valuable aid generally in efficiently controlling train movements under all signal systems as well as providing the many other advantages inherent in this new form of communication.

Soldering Aid

A pencil-type solder dispenser devised at General Electric's Schenectady Works prevents contamination of solder from handling and dirt. It was made of a piece of methyl methacrylate resin tubing. The brass nozzle is cemented into the body of the tubing with a press fit. Before loading the solder into the dispenser, it is form wound on a drill rod in a bench lathe. The operator pulls the solder from the dispenser with pliers as it is needed.

The dispenser prevents contamination from handling and assists the operator in placing the solder exactly where it is wanted

Vapor Cleaning of Motors

By N. J. Greene * and
R. W. Shoup †

An effective method of preparing motors and generators for a first-class rewinding job

To a modern repair shop the proper cleaning of cores to be rewound goes beyond removing old coils and scraping out the slots. Grease must be removed, paint on the frame taken off, vent ducts cleared, and laminations cleaned.

To help do this job properly the National Electric Coil Company, Columbus, Ohio, installed several years ago, the vapor cleaning tank shown in the illustration. Although the unit is technically known as a "de-greaser," it is in effect much more. Its cleaning action not only removes grease and dirt but also enough of the varnish on the winding to facilitate removal of coils, eliminating much of the hazard of lamination damage when extremely tight coils must be stripped from the slots.

Motor frame surrounded by cleaning vapor in degreasing tank

The net vapor depth of the "de-greasing" unit is four feet, while the total height of the tank is approximately nine feet, necessitating the use of a pit or platform, the pit being preferable and normally recommended. The tank is heated by natural gas, and ordinary city water is used in the condensing coils. Controls on both gas and water are fully automatic.

Operation

In operation the cleaning solution is brought to a boil and the vapor line allowed to rise to the condenser coils located about three feet below the top of the tank. The apparatus to be cleaned is lowered into the gaseous medium existing between the boiling pan and the condensing coils. The vaporized cleaning solution is kept at a temperature of 188 deg. F., much higher than the object being cleaned, and so condenses upon it attacking grease, dirt and varnish. (It should be noted here that the solvents normally used in this type apparatus have little dissolving effect upon some types of coating materials such as shellac and certain synthetic enamels.)

The condensation is so rapid that the fluid flows from the work in a steady stream, carrying with it dissolved materials. The action gives the appearance of the liquid being fed upon the work from an invisible pipe line.

When the temperature of the work reaches that of the vapor, condensation ceases and the cleaning prooess stops. At this point the operator can spray the unit, using a stream of the same cleaning fluid forced by pump through a hose and nozzle. The cleaning fluid used for this purpose is drawn from a reservoir containing distilled cleaning solution which has been condensed previously on the cooling coils.

This transition from liquid-to-gas-to-liquid makes it a simple matter to keep the tank clean. By directing the condensed solution to a reservoir instead of allowing it to return directly to the boiling pan, all the liquid can be condensed into the reservoir. The residue, consisting of dissolved grease, paint and dirt can then be removed from the boiling pan.

After spraying, the work is withdrawn from the cleaning tank and a few strokes of a wire brush removes loose residue and flakes of varnish. If the slots have been dirty, it may be necessary after removing the coils, to return the stripped core to the cleaning tank for another treatment; a second cleaning only occasionally needed.

Solvent

There are two important solvents normally used in "vapor de-greasing," trichlorethylene and perchlorethylene—both pronounced exactly the way they are spelled. They are sold as proprietary products under various trade names. These chemical compounds contain small amounts of a substance known as a stabilizer or an inhibitor. This stabilizer retards any decomposition of the chemical which may occur under certain conditions of use with the consequent formation of acidic decomposition products. In general, these chloro-hydrocarbon solvents may decompose due to three fundamental causes: (1) presence of air (oxidation); (2) presence of water (hydrolysis) and (3) high temperature (pyrolysis). The first type of

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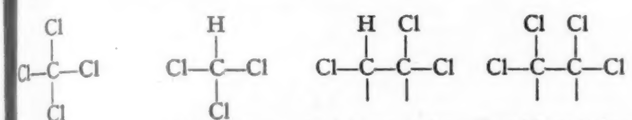
decomposition is accelerated by high temperatures and the last two by light and by certain impurities. Hydrolysis may be accelerated by the presence of metals such as iron.

These ethylene compounds are first cousins to carbon tetrachloride. They are members of a large family of chemical compounds which, because of their structure, are called unsaturated. By comparing the empirical formulae of several similar compounds, this structure identifying the family is readily discernible.



Carbon Tetrachloride — Chloroform — Trichlorethylene — Perchlorethylene

(C—Carbon, Cl—Chlorine, H—Hydrogen)

From the molecular formulae of carbon tetrachloride and chloroform shown above it is apparent that carbon has an availability, or valence, of 4, i.e., one atom of carbon will cling to four atoms of other combining elements having a valence of 1, such as hydrogen or chlorine, to form one molecule of the resulting compound.

It will be noticed that in the formulae for trichlorethylene and perchlorethylene the valence of 4 of the carbon atoms is not entirely satisfied. The chemist indicates this unsaturated condition by using "double bonds" between the carbon atoms in this manner: $-\overset{|}{C}=\overset{|}{C}-$.

Such a chemical structure usually indicates a high chemical activity, and this, together with chlorine which imparts high solvency to the molecule, produces the properties which make it effective in "de-greasing." There are, of course, other similar compounds which can be used in the same application. National's "de-greasing" apparatus can accommodate both of the solvents discussed here, but trichlorethylene is ordinarily used because its properties have characteristics best adapted to present requirements. Other shops confronted with different demands may find it more desirable to use perchlorethylene.

Normally inhibited trichlorethylene boils at 188 deg. F., possesses some toxicity, and tends to react with certain of the lighter metals such as aluminum but can be used in any motor cleaning applications. Other highly inhibited trichlorethylenes can be used with aluminum where the temperature limits of the trichlorethylene are desirable. Perchlorethylene boils at 250 deg. F., has less toxicity, and little or no action on the lighter metals.

Both of these ethylene compounds have been used extensively in the dry-cleaning industry; however, perchlorethylene is preferred for this purpose because it is much heavier than trichlorethylene and so, easier to reclaim through condensation. This, however, is not a consideration in vapor cleaning since the natural sequence of operations cleans the fluid by redistillation.

The several advantages of vapor cleaning are:

1. Varnish is removed from clogged vent ducts allowing the resumption of normal ventilation.

2. The heavy, multiple layers of varnish resulting from previous dips and bakes are removed from frames, allowing radiation and dissipation of operating heat to again attain their normal values.

3. Grease is removed from cone rings and commutators, providing a clean surface to which insulating and protective coatings may adhere.

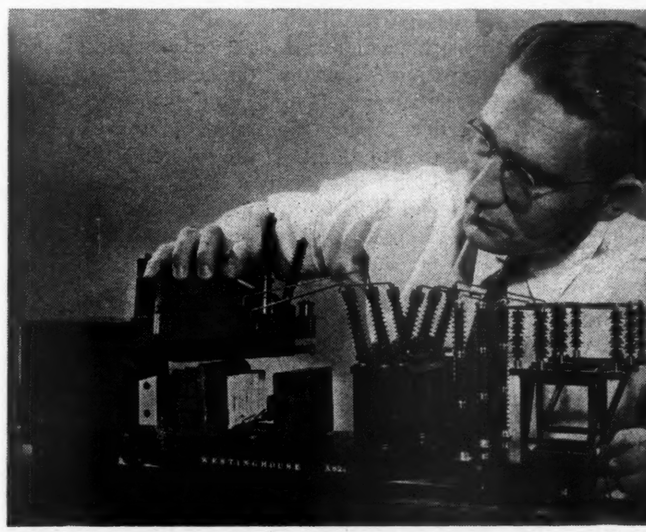
4. Laminations are kept in better shape because of easier removal of old coils.

Portable Substation on Railway Car

A complete mobile substation, mounted on a standard railway flat car, has been designed by engineers of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Portable stations have demonstrated that they have the same high degree of reliability found in modern stations of conventional design. Railway-car mounting is a further development of mobile-substation equipment.

These high-voltage substations are engineered to meet the requirements of the system on which they are to operate, are entirely self-contained and can be quickly taken to any point where railroads exist. Total time required to put the equipment in operation includes, of course, that taken for transit plus time to make the necessary mechanical and electrical connections.

The complete substation has all switching, transforming, distributing and protecting features of a modern roadside station. These include a three-phase transformer, high-voltage disconnecting switch, oil-circuit breaker, lightning arresters and a set of low-voltage switchgear. The low-voltage switchgear comprises several feeder circuit breakers, control, and protective relay equipment. The main power transformer is of shell type construction with forced-oil circulation and air-blast cooling. The shell type core, when laid on its side, provides strength and stability to withstand vibration and shock experienced in rail transportation.



Model of power substation designed to fit on a railway car

The new design includes a turntable mounting for the high-voltage circuit breaker. There is also a hinged collapsible structure for the high-voltage disconnecting switch. These features permit maintaining full electrical clearance between phases and to ground when the substation is set up for operation, but keeps within railroad clearance when in transit.

High-voltage incoming lines can be dead-ended to the line-insulator stack at the disconnecting switch. Low-voltage lines can be connected to the low-voltage switchgear either by cable or by overhead wires going directly to low-voltage roof bushings. In this manner, all special masts or structures on the car have been eliminated.

The railway-car substation permits taking power from a system at any point where transmission line and rails are close together. It meets the four major requirements for this type of service—mobility, flexibility, simplicity, and economy.

Circuit Breaker Contacts

Do electrical contacts on starters and circuit-breakers burn away faster in air or in oil? Opinions seem to be contradictory.

Improved Designs Increasing Use of Air Breakers

Whenever flow of current is interrupted by contact separation, there is a tendency to arcing across the contact tips. In opening a circuit-breaker, contact resistance increases rapidly as contact pressure decreases. At low values of current, the I^2R heat loss at the point of reduced contact pressure is usually not large enough to result in permanent damage to contact tips. When the interrupted current is high and the time of contact separation sluggish and long, sufficient local heating may be concentrated in the small separating contact area to melt, splash and vaporize the contact material. Excessive arcing leaves the contact surfaces pitted, beaded, darkened, and porous. Arcing may even be so vicious as to cause closing contact tips to weld together. When damaged contact surfaces are dressed and smoothed out in an effort to maintain satisfactory contact area and reduce local heating, additional contact material is lost until mechanical considerations make the replacement of the contact tip advisable.

Arc Characteristics

The characteristics of the arc and the ease with which it may be ruptured depend on various interrelated factors, most important of which are the value of the current flowing before the circuit is opened, time of contact opening, the voltage across the contacts after they open, arc length required for extinction, size and material of contact tips, initial and final contact pressure the power factor of the load, the distributed capacitance of the circuit, whether the arc is interrupted in air or under oil, and finally, whether the power supply is a.c. or d.c.

In two circuits with similar electrical characteristics, on equipped with air-break and the other with oil-break contacts, the arc in air will cause less damage to contact tips than the arc under oil.

The arc is a necessity in circuit interruption and on it depends the successful transition from conduction to insulation as the current carrying contacts open. The problem in arc rupture is therefore not the elimination of arcing but its proper handling to reduce the wear and tear caused by it.

D.C. and A.C. Arcs

The interruption of a d.c. arc is a relatively simple process inasmuch as it depends largely on gap length necessary to prevent the sustenance of the arc. While arc length may vary with the current to be interrupted and other conditions that may influence the design of the circuit breaker or starter, it usually exceeds the distance between contacts as a result of drawing out of the arc or magnetic blowout. The arc is interrupted when the voltage required to maintain it becomes higher than the circuit voltage.

Arc interruption in an a.c. circuit is a complex matter as the stored energy is generally dissipated in the arc at the breaking contact. Its successful extinction largely depends on the natural frequency of oscillation of the circuit. A slow break is also injurious to the contacts as it will permit the normal circuit voltage to build up a sustained arc across the contacts. Time of interruption i[s] therefore an important factor.

When a contact opens and an arc is drawn, two oppos[-]ing actions arise each of which struggles to gain pre[-]ponderance over the other. The first is the effort of th[e] circuit voltage to maintain the current across the con[-]tacts which prevailed prior to the opening. The conse[-]quent arc path is the source of ions produced by therma[l] ionization and ionization by collision. Inasmuch a[s] ionization varies almost directly as the voltage gradien[t] which depends on the conductivity of the complete pat[h] and in itself is not a stable condition with respect to time arc interruption becomes more difficult at high voltages The second is the effort of the air gap to recover an[d] maintain its dielectric strength while the circuit voltag[e] alternates with line frequency. This is brought abou[t] by the recombination of ions, by ions re-entering th[e] contact surfaces and by introducing un-ionized gase[s] which tend to absorb the arc ionization. The objectiv[e] in circuit breaker design for operation under unfavorabl[e] circuit conditions is therefore the increase of the rat[e] of de-ionization of the arc path.

Air Circuit Breakers

In air circuit breakers, the hot gases produced as [a] result of arcing are free to expand and move away swirl[-]ing from the arc chutes which promote upward ga[s] currents. Magnetic blowout devices with coils havin[g] proper flux and current relations further encourage th[e] upward thrust and dispersal of the arc. The arc is kep[t] moving and therefore cannot overheat, melt and vaporiz[e] much contact material.

Oil Circuit Breakers

Under oil, however, circumstances are different. Whil[e] oil is a better means of de-ionization than air and it[s] dielectric properties make its use desirable in circui[t] breakers of 2200 V. and over, mostly for reasons of com[-]pactness in design, the presence of oil around the spark gap is undesirable for two reasons: first, the intense hea[t] of the arc causes burning and vaporization of a certain quantity of oil and tends to prolong arcing time; second the relatively denser oil tends to confine the hot gases o[f] the arc to the immediate vicinity of the gap and concen[-]trate the injurious effects of the arc on the contact ti[p] area.

Essentially, the principle involved in the extinction o[f] arc under oil is the same as in air. An arc path and gases are formed in both cases. In the case of the oil circuit breaker, the un-ionized gas formed by the local decompo[-]sition of oil helps to de-ionize and quench the arc. Thi[s] gas, however, must be formed quickly and forced int[o] the arc path by some artificial means in order to brin[g]

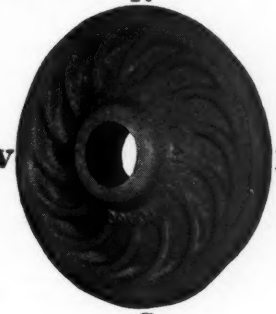
(*Continued on next left-hand page*)

Can you answer the following question? Suitable answers will be considered as contributions and will be published in a subsequent issue. If you have questions to ask, send them in also. Answers and questions should be addressed: Electrical Editor, *Railway Mechanical Engineer*, 30 Church street, New York.

How can I install receptacles in a large office so that adding machines and dictaphones can be used at any location? There are no posts on which to fasten the outlets.

ALL A.M.C.C.W. TEMPERATURE CONTROLS ARE

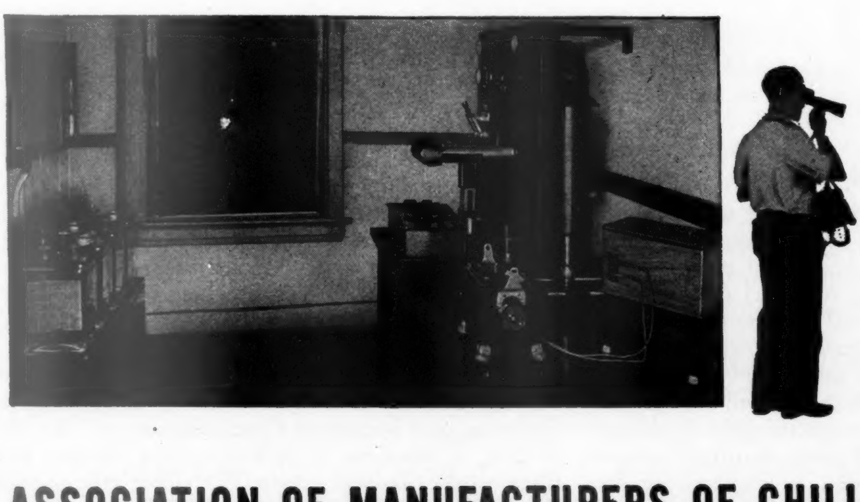
Centrally Tested



Uniform processing temperatures during the manufacture of Chilled Car Wheels are assured by having all pyrometric control equipment periodically tested, repaired and calibrated at *one central Association laboratory*. Through this procedure, all pyrometric apparatus used in the many foundries of the Association is calibrated to the same standards — with resultant uniformity of product. As a further safeguard to accurate temperature measurement, the Association also manufactures and distributes all the thermo-couples used by member foundries.

In addition to periodic central laboratory testing, all instruments are checked on the spot by Association inspectors during general inspection of the foundry.

Assured temperature control is but one of numerous precautions constantly guarding the uniformity of Chilled Car Wheels.



Part of the equipment used in testing pyrometric controls at the Central A.M.C.C.W. laboratory.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

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the arc in contact with fresh un-ionized oil. This method helps to de-ionize the arc and limit the total amount of hydrocarbon gases evolved during the oil decomposition.

Another effective means of arc extinction is the method of moving the arc away from the main contacts into a position where it can be broken up into multiple breaks in series, forced into pockets loaded with un-ionized oil or forced into a large volume of fresh oil which will produce the necessary de-ionizing effects. The arc is thus kept moving until completely de-ionized. This turbulence helps to keep the contacts from burning and pitting even at very high currents.

In order to expect satisfactory service from oil circuit breakers, the following points should be checked in relation to the particular application and care must be taken to maintain prescribed specifications.

Oil Requirements and Deterioration

For satisfactory operation, oil for circuit breakers must meet the following specifications in part or in full according to local and service conditions: high dielectric strength; freedom from acids from refining, alkalis and sulphur; low viscosity to cool the arc with fresh oil; low specific gravity to keep water out of the contact area; high resistance to emulsion to keep water out of suspension from oil; resistance to formation of carbon and sludge as a result of arcing.

The two principle causes of oil deterioration are water and oil carbonization caused by arcing.

The tendency of oil to absorb moisture from the air is usually very small. The main source of water contamination is through condensation on the surface of the oil or on the inside of the tank.

Carbonization of oil due to arcing is unavoidable. The carbon formed rests on the mechanism, some settles at the bottom of the tank and the rest remains in suspension. This carbon lowers the dielectric strength of the oil, reduces its resistance to emulsification and lowers the surface resistance of the oil to water.

The increased viscosity of the oil in cold weather causes a larger amount of carbon to be formed than would be formed at higher temperatures. As the viscosity rises with decreasing temperatures, carbon dispersion and separation also becomes more difficult.

Oil is not a good heat conductor in the restricted interpretation of conductivity. The sludge formed by a heated oil in contact with oxygen is however a comparatively better conductor.

Oil Tank

The tank is intended to contain the oil under which the circuit is to be interrupted. It also serves to dissipate the heat produced in normal conduction and arcing by internal circulation and coming in direct contact with the tank. The tanks of some circuit breakers often leave the impression of over-generous design allowing more oil distance between live parts and tank than breakdown tests would prescribe. While such a possibility may well exist, after considering rupturing capacity, circuit voltage and load current, the provision of such seemingly excessive dimensions is usually intended to compensate for the loss of oil distance caused by large volumes of ionized gas formed when heavy currents at high voltage are interrupted. Circuit voltage alone may not be used as a basis for determining oil distance. Location and type of service must, however, be given consideration.

Contact Tip Material

The fundamental purpose of a contactor or circuit breaker is to make and break contacts and unless this is done properly the whole circuit becomes unreliable. The reliability of a contactor, starter or circuit breaker depends mainly on the contact materials used on the main, intermediate and arcing contacts, contact pressure, contact sweeping and rolling, contact size in relation to current, arrangements provided for arc suppression, and its design as to ease of heat dissipation when in frequent operation.

Copper, silver and its alloys are the most commonly used contact tip materials on starters, contactors and circuit breakers.

Copper is the best material from the standpoint of wear. It oxidizes readily, however, and its oxide is a poor conductor. This increases contact resistance and contact temperature which causes further oxidation and overheating of tips. The sliding motion of the tips in closing and opening the contacts partly wipes out the oxide formed and helps to lower contact resistance. Oil immersion retards oxidation of contacts and tends to maintain lower contact temperatures.

Silver causes much less contact resistance heating than copper. When silver oxide is formed due to some heating, the process of oxide formation is relatively slow. Silver oxide is also a poor conductor but returns to metallic silver when heated. It is costlier than copper, wears out more rapidly and has a great tendency to freeze and weld on closing. It is therefore used on main contacts which carry heavy currents for extended periods or on double break contacts on relays.

Choice of Air or Oil Circuit Breaker

Circuit breakers rated at 600 volts and lower are usually of the air-break type unless the presence of corrosive acid or alkali fumes makes the use of the oil-immersed type advisable. For voltages above 2200 volts, oil immersed contacts are almost universally used. Oil circuit breakers are not used extensively for interrupting d.c. circuits for two reasons: first, d.c. arcs not being easy to rupture under oil cause rapid carbonization and deterioration of the oil; second, in the case of highly inductive loads, the sudden quenching of the switching arc gives rise to a voltage surge which may break down circuit insulation. Because the air gap required to extinguish an arc is much greater than required under oil, air circuit breakers for very high voltages are not made. Normally, air circuit breakers are made for voltages up to 600 volts while in some railway services high speed air circuit breakers are used interrupting 15,000 volts a.c. The fundamental idea here is to interrupt high value, fast rising current in the minimum of time. In oil circuit breakers, a high speed of arc interruption is desirable to limit the energy expended by the arc in producing oil vapor. When air circuit breakers are improved further in design they will perhaps be freely used in high-voltage a.c. interruption service.

Oil-immersed starters and circuit breakers should not be used indiscriminately because of their relatively high first cost and increased tip maintenance. An air circuit breaker is often the more economical solution in applications where damage caused by slight corrosion is more than compensated by savings in lower first cost and reduced tip maintenance.

The air circuit breaker is becoming a successful and economical competitor of the oil circuit breaker and recent progress along this line is gradually introducing it in the field of oil circuit breaker application.

R. G. Cazanjian
Electrical Engineer

(*Turn to next left-hand page*)

The Locomotives You Buy in 1944

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And so they will — if they're Lima-built! Locomotives are bought for long years of profitable service — and that points the *paramount* importance of the three factors of correct design, sound materials, and accurate workmanship.

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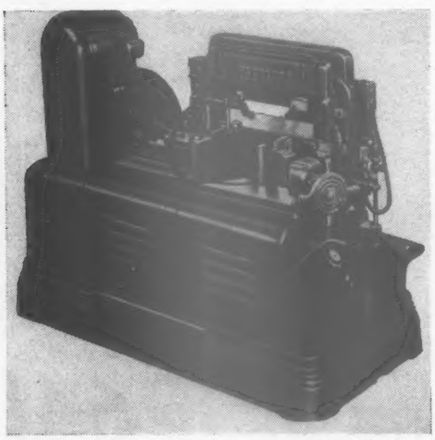
NEW DEVICES

Power Saw For Metals

The Peerless Machine Company, Racine, Wis., has redesigned its line of metal-cutting power saws and has incorporated hydraulic attachments in the new models. A hydraulic micro-set length gauge is mounted on the conveyors of the machines to gauge accurately the length of cut being made. Feed pressure is adjusted by a Vernier finger-tip screw control and the oil capacity of the feed unit has been increased 75 per cent.

A four-sided saw frame completely surrounds the blade and the work. A backing-plate support permits the application of



Metal-cutting saw with hydraulic, micro-set length gauge

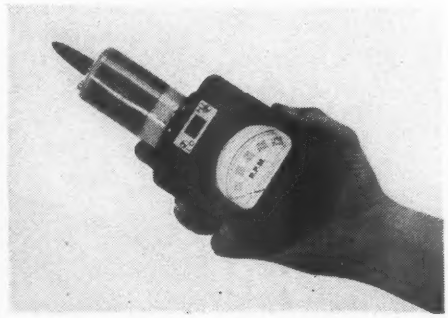
maximum feed pressure with a minimum of strain on the blade. The saw frame is balanced in its reciprocating travel by dual hydraulic cylinders and the driving rod is connected to the frame in line with its center which insures that the driving force will always be centrally applied.

Seven-inch and eleven-inch automatic-operating models are two of the variety of sizes being manufactured.

Electric Tachometer

A self-energized tachometer that can be used either as a hand type or separable type is announced by the Ideal Commutator Dresser Company, Sycamore, Ill. The tachometer consists essentially of a small generator, coupled electrically to an electric meter. The generator has a small, permanent Alnico magnet rotor which is mounted on precision sealed ball bearings and capable of continuous operation at any speed within the limit of the meter.

The meter or indicating instrument is a rectifier type with a D'Arsonval movement. It is capable of withstanding a momentary overload up to four times the maximum



The tachometer with generator and meter connected with hand-operation

speed indication without damage. The meter has two scales, the change from the 0-2,500 to the 0-5,000 scale being made by a small switch.

The generator and meter are made as distinctly separate elements and coupled together by a precision made bayonet lock. The units may be used together or may be separated mechanically and connected electrically by a two-conductor cord. A cord up to several hundred feet long can be used without introducing an appreciable error.

Portable Cleaning Tank

A portable, electrically heated, insulated dipping tank is being marketed by the Aeroil Burner Company, West New York, N. J. The unit has two dipping tanks, one to hold a hot cleaning solution and the other to be used for either hot or cold rinsing fluid. Each compartment has a separate automatic heat control and the regulating thermostats can be set for temperatures between 100 and

Electrically heated cleaning tank with two compartments for cleaning solutions and rinsing fluids

550 deg. F. The heating units are located inside each compartment on the bottom of the tank. The average dipping capacity of each compartment is 11 gal. with a full capacity of 14 gal. The unit is completely insulated at the sides, bottom and top and in the partition between the compartments. It operates on alternating or direct current at 110 or 220 volts.

Air Filter

A six-outlet manifold and a self-dumping water trap are features of compressed-air line filters announced by Filters, Inc., P. O. Box 471, Glendale, Calif. The self-dumping water trap disposes of water filtered out of the air line and operates by float control

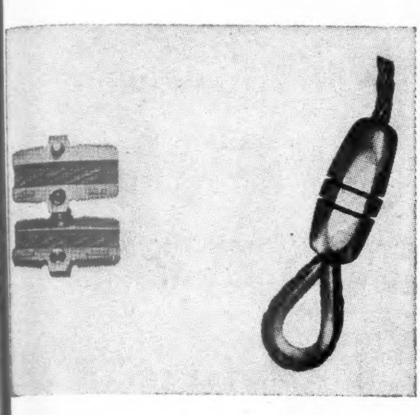
Six-outlet filter and water trap for compressed-air lines

which opens and closes the discharge valve. The filter serves as a protection to air tools in preventing the entrance of dust, rust, scale, oil and water which might enter the line.

Wire-Rope Clamps

A line of high-strength wire-rope clamps ranging in size from 1/16 in. to ¾ in. are being produced by the Safe-Line Clamp Div., National Production Company, 4561 St. Jean Ave., Detroit 13, Mich. The clamps consist of four parts which are readily assembled by unskilled workmen and without the need for special tools. Two, taper-threaded sections are placed on the exposed sides of a wire rope and are squeezed together in a vise-like grip when two taper units are tightened. According to the manu-

facturer, a long series of tests has indicated that the holding power of the clamps is far in excess of any demands which might be put upon the ropes to which they are attached. In fact, the clamps have held past the breaking strength of the strongest wire ropes. This holding power is obtained through the method of grooving employed



A four-piece wire-rope clamp which can be assembled without using special tools

in the two halves of the clamp which provides for a gripping action on the large wire strands as well as the individual wires composing the strands.

Centrifugal Clutch

An automatically engaging and self-disengaging centrifugal clutch, known as the Torkontrol clutch, is being manufactured by the Amalgamated Engineering and Research Corporation, Chicago. These clutches have been built in sizes ranging from ¼ to 500 hp. The unit can be used as a coupling between shafts or as a driving pulley or gear in a transmission, as well as a starting cushion between power units and driven mechanisms. It consists of a partially filled oil chamber fitted with a freely rotating hub which carries a series of movable wedge-shaped flyweights. As the hub revolves these weights fly outwardly and engage the internal rims of the outer case binding the hub and shell into a functionally solid pulley or coupling.

The unit works equally well in either direction and is set to engage or release at given speeds and to slip under overloads. This unit is said to permit the use of smaller engines or motors which start without load, and to give a smooth cushioned application of power and straight-line acceleration with a saving in operating cost.

A cushion-type clutch which operates by centrifugal action

Dry-Type Transformers

The General Electric Company, Schenectady, N. Y., has designed a new line of indoor dry-type transformers for primary circuits 601 to 15,000 volts which provide greater safety and ease of installation than previous dry-type designs, as well as a pleasing outward appearance. The design employs sheet steel with flowing lines, smoothly rounded corners, and a two-tone gray finish. The weight of the material used for the new enclosing case is less than that for the old screened enclosure. In addition, the new case improves the circulation of the cooling air.

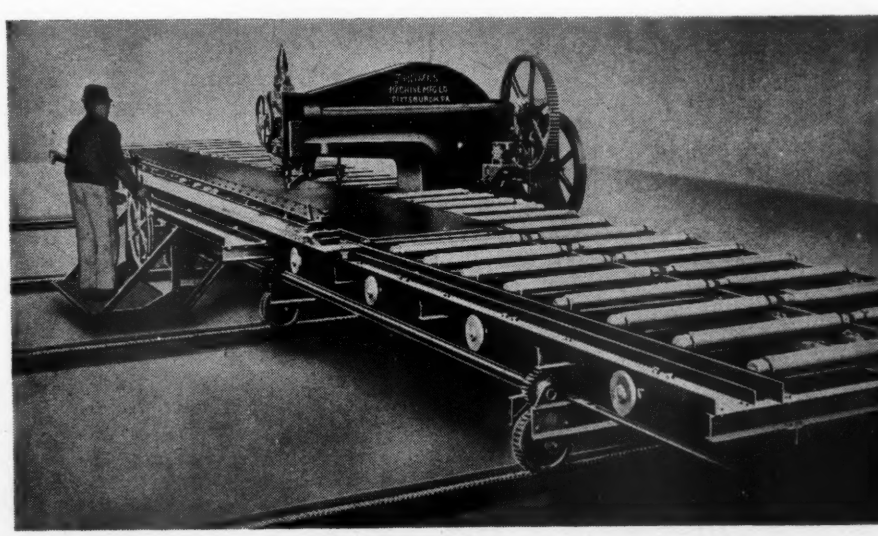
Horizontally louvered sections on two sides of the case can be removed easily, making the interior accessible for cleaning and tap changing. The taps are brought to a convenient terminal board located just below the edge of the casing and close to a diagrammatic nameplate. All live parts are metal-enclosed. The high-voltage-terminal compartment cover can be removed to facilitate connecting the transformer to the supply circuit. Similarly, access to the low-voltage terminals is gained by removing the low-voltage compartment cover. The solid side plate on each side of the transformer can be taken off to clean or inspect the core and coils. A removable top section at each end of the case facilitates drilling and installation when overhead conduit connections are desired. Holes in the case permit rods to be inserted through interior supports for easy handling. If crane facilities are not available, jack bosses on each of the four lower corners facilitate moving the unit.

The metal closures afford protection, improve ventilation and give the transformer a pleasing appearance

The solid sheet-metal top and sides and the deeply pitched louvers protect the unit from hazards which might result with open-screen enclosures, such as sprinkler-system operation or the accidental contact of rods or wire being carried by workmen.

Plate-Punching Table

A plate-punching table of unusually large capacity is a product of the Thomas Machine Mfg. Company, Pittsburgh, Pa. The tables have a capacity for handling plates having a length of 30 ft., a width of eight feet and a thickness of one inch. They are attached to a heavy channel-section carriage by quick-acting clamps to insure positive movement of plates longitudinally independent of friction or other difficulties sometimes encountered with friction drives when plates are warped. Spacing attachments can be used for accurate and rapid punching either longitudinally or crosswise, or templates can be used.



Sheets are clamped firmly to a movable table on this large plate-punching machine

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FRANKLIN RAILWAY SUPPLY COMPANY, INC.

Announces

Recognizing the trend in locomotive design toward higher boiler pressures, and noting the many new factors in current steam locomotive operation, Franklin Railway Supply Company, Inc. has developed an entirely new Booster to meet today's more exacting demands. Based on the experience gained from the operation of thousands of Boosters in service all over the country, the new Type "E" Booster has been expressly designed to conform to the new conditions under which it is to serve. » » » A few of the many improvements incorporated in the new Type "E" Booster are listed below.

FRANKLIN RAILWAY SUPPLY COMPANY, INC., New York, Chicago

In Canada: Franklin Railway Supply Company, Ltd., Montreal

1

Short Cut-Off takes full advantage of the expansive properties of the steam and effects marked economies in steam consumption.

2

A Special Starting Feature enables the Booster to develop maximum starting effort.

3

Cast Steel Cylinders, with integral inlet and exhaust manifolds. The large steam and exhaust passages give maximum inlet pressures and minimum back pressures.

4

Dynamic Balancing in the new Type "E" Booster contributes to smooth operation and higher operating speeds.

THE *New* TYPE "E" BOOSTER

* Trade Mark Reg. U. S. Pat. Off.

5

The Roller Bearing Crank Shaft, securely housed in the engine bed, makes for smooth running, freedom from lost motion, and long life with minimum maintenance.

6

New Air Control assures efficient Booster operation, and engagement at higher speed.

7

A New Design of Ball Joint with self adjusting packing and large passage areas insures the free flow of steam to and from the Booster.

8

For Each Booster Application the proper gear ratio is selected for a given boiler pressure, wheel diameter and adhesive weight to obtain maximum Booster power.

NEWS

Eastman and Rogers Reappointed to I. C. C.

THE Senate on January 24 confirmed President Roosevelt's reappointment of Joseph B. Eastman and John L. Rogers to the Interstate Commerce Commission for new terms expiring December 31, 1950. The nominations were reported favorably from the committee on interstate commerce on January 21, the committee having acted promptly after the close on that day of the hearings wherein a practitioner before the commission had asked that action on the Rogers nomination be deferred.

Mr. Eastman completed 25 years of service as a member of the Commission on February 17.

Henley Replaces Flynn as Chairman of Mechanical Division

W. H. FLYNN, general superintendent of motive power and rolling stock of the New York Central and chairman of the Mechanical division, A. A. R., has resigned the latter position, which he has held for the last 3½ years, because of the increasing burden incident to this latter office. R. G. Henley, general superintendent of motive power of the Norfolk & Western and vice-chairman of the Mechanical division, succeeds Mr. Flynn as chairman of the divison.

Duncan W. Fraser Sees Postwar Locomotive Demand

COMMENTING on the postwar outlook for locomotives, on February 4, Duncan W. Fraser, president of the American Locomotive Company, expressed the opinion that "there will be a considerable demand for locomotives of all types in the years immediately following the war. In our country 70 per cent of all locomotives are 20 years old or more. Their obsolescence has been speeded by heavy wartime usage and by the fact that locomotives of greatly improved design have been developed in recent years and are ready to serve our railroads with more efficient motive power as soon as conditions permit. We also expect to be busy helping to replace hundreds of locomotives [largely steam] in Europe which have been destroyed in the war."

"In the United States," Mr. Fraser said, "we expect that the Diesel locomotive will occupy an increasingly important position. Its value in switching operations has been firmly established. We may also look for wider applications in heavy freight and passenger service, brought about by the development of more powerful and lighter Diesel engines, with resultant operating efficiencies.

"Progress in steam locomotives has gone hand in hand with Diesel developments. Modern steam locomotives, capable of 20,000 miles per month are now in use, reflecting a high level of availability similar to that of Diesel locomotives. It is unlikely that there will be any one dominant type of locomotive, at least in the foreseeable future. Steam, Diesel and electric, each has its advantages and the selection of motive power is influenced by operating conditions and needs which vary between railroads, and on the same railroad, so that the final choice may be either one or all three from the standpoint of economy and service."

Freight-Car and Locomotive Installations in 1943

CLASS I railroads put 28,708 freight cars and 773 locomotives in service in 1943, according to the Association of American Railroads. This was the smallest number of cars installed since 1940, but the greatest number of locomotives since 1930. In 1942 the railroads put 63,009 new freight cars and 712 new locomotives in service

[According to a statement issued by the Office of Defense Transportation on January 25, production in 1943 of railroad equipment for domestic use totaled 830 locomotives, 28,790 freight cars, and 661 troop sleepers and kitchen cars.]

Of the new freight cars installed in the past calendar year, there were 1,923 plain box, 356 automobile, 8,792 gondolas, 15,137 hopper, 2,446 flat, four refrigerator, three stock, and 47 miscellaneous cars. The new locomotives included 429 steam, 15 electric, and 329 Diesel-electric, compared with 308 steam and 404 electric and Diesel-electric in 1942.

Class I railroads on January 1, had 35,737 new freight cars on order. On the same date last year they had 27,061 on order. The former total included 10,944 plain box, 3,508 automobile box, 4,869 gondolas, 13,651

(*Continued on next left-hand page*)

Orders and Inquiries for New Equipment Placed Since the Closing of the January Issue

LOCOMOTIVE ORDERS

Road	No. of Locos.	Type of Loco.	Builder
Canadian Pacific	25	Frt.	Montreal Loco. Wks.
	45	Frt.	Canadian Loco. Wks.

LOCOMOTIVE INQUIRIES

Road	No. of Locos.	Type of Loco.	Builder
Chesapeake & Ohio	15	2-6-6-6	

FREIGHT-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
Canadian Pacific	140	50-ton refrig.	National Steel Car Co.
	500	Gondola	National Steel Car Co.
	300	Hopper	National Steel Car Co.
	100	Hopper	Canadian Car & Fdy. Co.
	1,000	Box	Canadian Car & Fdy. Co.
	100	Coal	Eastern Car Co.
Fruit Growers Express Company	200[1]	Refrig.	Co. shops
New York, Chicago & St. Louis	25[2]	70-ton hopper	American Car & Fdy. Co.
Pere Marquette	25[2]	70-ton hopper	American Car & Fdy. Co.

FREIGHT-CAR INQUIRIES

Road	No. of Cars	Type of Car	Builder
Central of Georgia	100	50-ton hopper	
	10	70-ton hopper	
Chesapeake & Ohio	5,000	50-ton hopper coal	
New York, New Haven & Hartford	1,000	50-ton box	
	1,000	50-ton gondola	

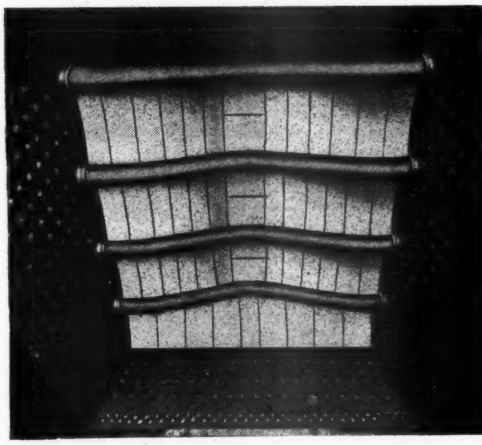
PASSENGER-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
Missouri Pacific	4[3]	70-pass. chair	Edw. G. Budd Mfg. Co.
	2[3]	56-pass. chair	Edw. G. Budd Mfg. Co.

PASSENGER-CAR INQUIRIES

Road	No. of Cars	Type of Car	Builder
New York Central	25, 50, 75 or 100	64-reserve-seat cars	
	25 to 50	56-reserve-seat cars	
	10 to 20	48-reserve-seat cars	
	13	32-reserve-seat cars	
	13	27-reserve-seat cars	
	4	21-reserve seat cars	
	2	Baggage-dormitory cars	
	4	Full-length dining cars	
	4	Kitchen-21-seat cars	
	10 to 18	Grill-dining cars	
	9	Dining cars	

[1] For delivery during March, April and May.
[2] For second quarter delivery.
[3] Subject to WPB approval. To be air-conditioned.



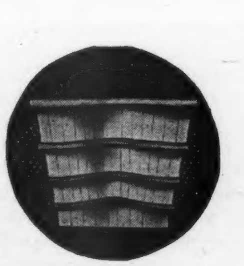
TAKE THIS STEP FOR COAL CONSERVATION

Coal on the tender represents not only certain dollars of expense but priceless man hours as well. Therefore, its careful conservation is a wartime duty

A generation of railroad men have learned that Security Sectional Arches are easy on the coal pile. A complete arch in every locomotive firebox is a fundamental step towards fuel conservation.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists



AMERICAN ARCH CO.
INCORPORATED
60 EAST 42nd STREET, NEW YORK, N. Y.

Locomotive Combustion Specialists

hoppers, 1,200 refrigerator, 200 stock, and 1,365 flat cars. Railroads also had 955 locomotives on order on January 1, this year, which included 339 steam, three electric, and 613 Diesel-electric locomotives. On January 1, 1943, they had 888 locomotives on order which included 355 steam and 533 electric and Diesel-electric.

The Office of Defense Transportation also reported 33 new locomotives on order on January 1, and 31 new locomotives installed in the year 1943 by other than Class I carriers. This brings the total of new locomotives on order on January 1, to 988 and the number installed in 1943 to 804.

Steel Founders' Society Elects Officers

The Steel Founders' Society of America has elected the following officers and directors for 1944-1945:

President—Oliver E. Mount, American Steel Foundries; *Vice-President*—F. Kermit Donaldson, Machined Steel Casting Co.; *Executive Committee*—Oliver E. Mount, chairman; A. M. Andorn, Penn Steel Casting Co.; T. F. Dorsey, Fort Pitt Steel Casting Co.; *Members of Board of Directors*—A. M. Andorn; D. P. Murphy, Symington-Gould Corporation; J. S. Wardle, Mobile Pulley & Machine Wokrs; T. F. Dorsey; F. K. Donaldson; E. D. Flintermann, Michigan Steel Casting Co.; C. A. Binder, St. Louis Steel Casting Co.; W. E. Butts, General Metals Corp.; *Executive Vice-President*—Colonel Merrill G. Baker; *Secretary-Treasurer*—Raymond L. Collier.

Big Cut Made in Military Orders for Locomotives

Altered military requirements have resulted in a substantial reduction in the number of steam locomotives scheduled for 1944 production for such use, the War Production Board announced January 28. Military orders for locomotives weighing 80 tons or more have been cut by 741 units, or about 25 per cent, and for those weighing 50 to 80 tons by 162, or about 35 per cent, the announcement disclosed. However, military requirements for 1944 still call for more than 2,000 large (i. e., over 80 tons) and 300 small steam locomotives, is was explained.

The WPB statement stressed the point that the curtailment would not mean release of any existing production facilities to meet domestic requirements, since the original program had contemplated progressively increased locomotive production in each quarter of 1944. Instead of expanding operations to meet that schedule, the industry will be able to even out its production through the year, it was explained.

A.A.R. and O.D.T. Discuss Labor and Equipment Situation

An appeal to the Selective Service Board and the War Manpower Commission for aid in solving the manpower shortage of the railroads will be made by the Association of American Railroads and the Office of Defense Transportation, it was disclosed by Joseph B. Eastman, director of ODT and John J. Pelley, president of A. A. R., following a special meeting of members of A. A. R. and representatives of ODT at Chicago on February 3, called to consider the labor and equipment situation.

They also stated that, through co-operation with the War Production Board, materials will be made available so that the railroads may place orders for freight cars to the capacity, limited by available manpower and war work, of the plants of builders. It was estimated that the capacity will be between 60,000 and 70,000 freight cars in 1944 while later in the year the railroads will be permitted to order not to exceed 500 passenger train cars. A further meeting will be held in Washington to decide which railroads will be allowed, on the basis of needs, to order cars.

During the consideration of the passenger car situation, it was revealed that the lack of air-conditioning equipment was holding up the ordering of passenger cars because railroads felt that it would be uneconomical to build passenger cars with movable windows and other features essential to non air-conditioned operation and, after the war, having to rebuild them to accommodate air-conditioning installations. It was also disclosed that some air-conditioning equipment will be available by the end of the year and railroads were encouraged to place orders for passenger cars now for delivery next year.

In discussing the manpower shortage, Mr. Pelley said that approximately 270,000 men have been taken from the railroads for the armed forces and that they will lose about 84,000 more to selective service with in the next six months unless relief is afforded. A more liberal application of deferment of necessary employees will be sought while a request may be made for the release of some railroad workers from military service.

Field Staff to Spur Production of Equipment for Domestic Service

In an effort to increase the production of cars and locomotives for *domestic* service, the War Production Board has arranged for the field staff of the Army Transportation Corps to assist in expediting these programs, according to a letter from A. C. Mann, director, Transportation Equipment Division, WPB, dated February 1, and addressed to all builders of railroad cars and locomotives and to manufacturers of specialties.

The arrangement contemplates that field officers of the Army Transportation Corps will visit the plants of car and locomotive builders to determine the status of the building schedules and analyze any difficulties tending to retard production. These officers will be authorized to iron out, with the builders, any difficulties that may be corrected in the field within applicable priority or other regulations. If WPB assistance is required, such as uprating, additional material authorization, or directive, the field officers will report through the Railway Equipment Branch of the Transportation Corps to the Transportation Equipment Division of the WPB for handling the matter within the board. Field officers will also handle any surveys necessary to eliminate trouble with the production of component parts.

Army representatives are not authorized to make any changes in the scheduling of equipment and component parts, nor will the new expediting arrangement alter the handling of car and locomotive production under Army contracts.

Victory Freight-Car Drawings Issued

In an effort to get maximum production of badly needed freight cars in 1942, the Association of American Railroads acted to restrict car orders to 13 individual car designs, recommended by the Car Construction Committee of the Mechanical Division, in conjunction with the Freight Car Design Committee of the American Railway Car Institute. This action was taken at the request of the Office of Production Management, forerunner of the present War Production Board, and the cars included three box, one auto box, two hopper, four gondola and three flat-car designs, as described in the December, 1941, *Railway Mechanical Engineer.*

On recommendation of WPB, in the interest of conserving steel for war purposes, the A. A. R., Mechanical Division, in 1943 issued eleven Emergency standard composite car designs, including two 50-ton box cars (Dwgs. 1550 and 1551) with inside lengths of 40 ft. 6 in. and 50 ft. 6 in., respectively; four 50-ton fixed-end composite gondolas (Dwgs. 5-1918, 3143, 3144 and 5-1919) and one 70-ton drop-end gondola (SK F-5163-C); one 50-ton composite hopper (SK-7-13-42-B-B) and one 70-ton composite hopper (SK-7-13-C-B); one 50-ton composite flat car (Dwg. 510-F-54-A), and one 70-ton composite flat car (Dwg. 17592).

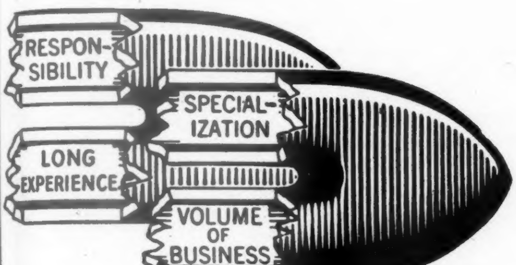
With a lightening of restrictions on the use of steel for freight car construction, the A. A. R., Mechanical Division, has just issued (February, 1944) 16 designs of Victory freight cars which have been approved by the WPB for construction this year. In the Victory cars, composite construction is eliminated and the basic design is essentially the same as the A. A. R. pre-war standard construction except for certain changes in detail such as substituting structural shapes for built-up plate construction and some modifications designed to meet service requirements more satisfactorily.

The Victory freight car designs include three box, one auto box, two hopper, eight gondola and two flat cars. The first box car is a 40- and 50-ton car, 40 ft. 6 in. long inside, made to A. A. R. Plates 1500-D and 1501-D, modified by the substitution of longitudinal steel floor stringers between the bolster and the car end, as shown on Plate E-1542, instead of diagonal braces. The second box car is the same as the first except for an increase in inside height from 10 ft. to 10 ft. 6 in. The third box car, of 50-tons nominal capacity, 50 ft. 6 in. inside length and 10 ft. 6 in. inside height, is designed with three optional clear door openings of 6 ft., 7 ft. and 8 ft., being made to A. A. R. Plates 1525, 1526 and 1527, modi-

(Continued on next left-hand page)

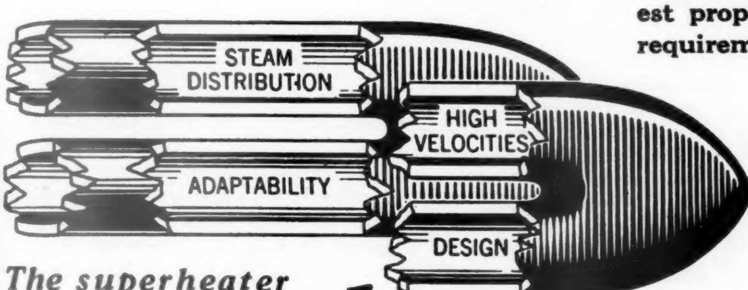
The Approach to a SUPERHEATER SPECIFICATION

Specialization



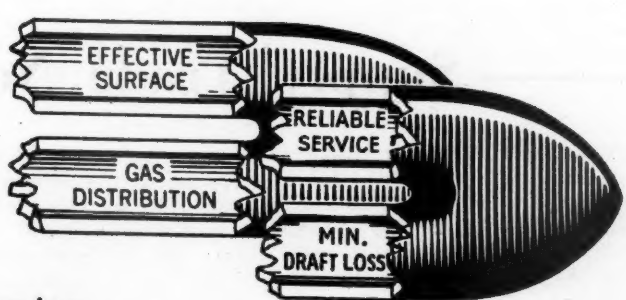
Organizations who do specialized work are leaders only when the specialization is of long standing and has wide acceptance.

It is fitting to state that the organization behind Elesco superheaters and its affiliates have specialized in superheaters for over thirty years. But this in itself is not nearly as important as the fact that in this specialization it is serving by far the greatest proportion of the world's superheater requirements.



The superheater tube MAKES the RETURN BEND

The RETURN BEND MAKES the Elesco superheater



In addition to the specialized engineering and experience behind Elesco in America—you have the added advantage of supplementing them with the research, practical experience and developments of Elesco affiliates in other countries.

Super-specialization might be a more appropriate term applying to this specialized service—Be sure to use it.

THAT'S ELESCO

A-149

THE SUPERHEATER COMPANY

SUPERHEATERS • FEEDWATER HEATERS
AMERICAN THROTTLES • STEAM DRYERS
EXHAUST STEAM INJECTORS • PYROMETERS

Representative of AMERICAN THROTTLE COMPANY, INC.
60 East 42nd Street, NEW YORK
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Montreal, Canada
THE SUPERHEATER COMPANY, LTD.

fied by the substitution of steel floor stringers as in the case of the first two box cars.

The 50-ton auto-box car has an inside length of 50 ft. 6 in., inside height of 10 ft. 6 in. and a clear door opening of 15 ft., being made to A. A. R. Plate 1528, modified by substitution of the longitudinal steel floor stringers. An optional end-door arrangement for this car is given in Plate 1540.

The two hopper cars, one of 50 tons and the other of 70 tons capacity, are made to A. A. R. Plates 600-D and 601-D, respectively, modified to incorporate I-beam body bolster construction in accordance with Plate E-651 and angle end posts as shown on Plate E-653. (The I-beam construction is used to save steel plate.) These cars are 30 ft. and 40 ft. 8 in. long inside and have cubic capacities of 2,145 cu. ft. and 2,773 cu. ft., respectively.

The first two gondolas are 50-ton fixed-end cars, with 41 ft. 6 in. inside length, 4 ft. 8 in. inside height and 1,840 cu. ft. capacity, level full. One of these cars, with a wood floor, is made to Dwg. C-27252-C, modified to include an A. A. R. Z-section center sill, and the other car, with a steel floor, made to Dwg. C-28263-B. Either of these cars may be further modified to incorporate six or eight drop doors, although general drawings covering this arrangement have not been made.

There are two additional 50-ton gondolas, one with fixed ends, steel floor, 16 drop doors, inside length of 41 ft., inside height of 5 ft. and 1,948 cu. ft. capacity, level full, made to Dwgs. 5-1595-A and 4-3599-A. The other has drop ends and a wood floor. It is 48 ft. 6 in. long inside, 3 ft. 6 in. high inside, has 1,383 cu. ft. capacity, level full, and is built to Dwg. 121743.

The first 70-ton gondola has drop ends, a wood floor, inside length of 52 ft. 6 in., inside height of 3 ft. 6 in., 1,745 cu. ft. capacity, level full, and is made to Dwg. C-27425-F. The next two 70-ton drop-end gondolas are the same size. They are 65 ft. 6 in. long inside, 3 ft. 6 in. high inside, and have a cubic capacity, level full, of 1,776 cu. ft. They are designed with a steel floor (Dwg. 5-1608) or a wood floor (Dwg. 139-11-292). One additional 70-ton drop-end gondola, with wood floor, made to Dwg. 139-11-355-A, has been approved by the WPB. This car is the same size as the first 70-ton gondola and differs from it only in utilizing a little heavier steel in some sections to give added strength and durability.

The two flat cars are both the same size, 53 ft. 6 in. long over the wood floor, one being a 50-ton car made to Dwg. 509-F-63-J, and the other a 70-ton car made to Dwg. 16393.

Second-Quarter Steel Allocations 94.5 P.C. of Tonnage Requested

Domestic transportation will receive for this year's second quarter 1,812,000 tons of carbon steel or 4.5 per cent of the 1,917,325 tons requested by the Office of Defense Transportation. This allotment, accompanied by proportionate allotments of alloy steel, copper and aluminum, said the ODT announcement, constitutes the largest amount made available since the ODT became a claimant agency under the War Production Board's Controlled Materials Plan. This year's first-quarter allotment was 1,538,645 tons.

Included is material for the construction of 18,500 new freight cars, 6,500 fewer than the 25,000 ODT requested but nevertheless enough, according to WPB to absorb maximum capacity available for car building during the third quarter. In the latter connection, it was explained, the third-quarter capacity must be taken into account in setting the second-quarter allotments because of the "lead time", i.e., the time required to get the allocated materials delivered to car builders' plants.

Mechanical Supervisor Given "Safety Ace" Award

A "Safety Ace" award is made by the National Safety Council to employees or supervisors in industry who are doing an outstanding job in preventing accidents in wartime—accidents that were hindering the war effort. Nominations are made to a committee of judges of the N.S.C. When a candidate has been accepted he is saluted nationally on the Blue Network radio program "Out of the Shadows," at which time he is sent a $100. war bond. William E. Buck, superintendent of the Michigan Central Railroad shop at Jackson, Mich., was given the "Safety Ace" award for his outstanding performance for the year 1943. During the seven-year period, 1937 to 1943, inclusive, the average casualty ratio per million man-hours was 3.60. For 1943 it was 2.85; the decrease in the ratio under 1942 was 40.8 per cent, or on a severity basis, 75 per cent. Mr. Buck has also devised two accident prevention devices which have been adopted by the New York Central System as a whole. He has spent his entire railroad career of 31 years in the Jackson shops, starting as a machinist helper. He was gradually advanced until he became general foreman in December, 1936, and was promoted to superintendent of shop February 1, 1941.

Supply Trade Notes

Baldwin Locomotive Works.—*W. Horace Holcomb* has been appointed to fill the newly-created office of vice-president-industrial relations for the Baldwin Locomotive Works and *James J. Nelson* has been appointed divisional vice-president in charge of the company's Cramp Brass & Iron Foundries division. *A. J. Tigges* has been appointed manager of consulting engineering for all divisions and subsidiaries of Baldwin. Mr. Tigges also will have charge of the engineering of new products and new applications with reference to postwar plans. Since his graduation, with a degree in electrical engineering from Massachusetts Institute of Technology in 1923, Mr. Tigges has been associated with the engineering firm of Jackson and Moreland in Boston, Mass.

◆

William Sellers & Company.—*Kreston T. Sorensen* has joined the staff of William Sellers & Company, Inc., as assistant to the president. Mr. Sorensen has recently been in charge of design of special secret ordnance weapons and material for the Ordnance Department, having charge of the engineering section located at the Franklin Institute. Until 1941 he was associated with The Baldwin Locomotive Works, in charge of design and engineering of the 60-ton tank. Mr. Sorensen was born in Denmark. In 1916, he served as an apprentice with the American Locomotive Company at Schenectady, N. Y. He later enlisted in the Navy for World War I, returned and acquired wide experience in machine-tool manufacture with a number of companies in the West. He joined the Southwark Foundry & Machine Company as engineer in charge of special products in 1923; went to Russia to supervise installation of rolling mill equipment, and in 1932 assisted in reorganizing the Kharkov Tractor Plant. In 1938 he had charge of engineering and installation of special aircraft equipment for Southwark in France. In 1939 he returned to the United States to take charge of heavy tank design for the Baldwin Locomotive Works.

K. T. Sorensen

◆

Aluminum Company of America.—*John O. Chesley*, head of the sales development division of the Aluminum Company of America, has been appointed railway sales manager, a position created to better serve the railway field in meeting the anticipated demand for aluminum in the construction of new equipment after the war. Mr. Chesley was a graduate of Brown University with a degree in mechanical engineering in 1911. He joined the Aluminum Company as a sales apprentice and was appointed manager of the Detroit, Mich., office in 1913 and manager of Pittsburgh, Pa.,

ales in 1915. Following service as an ensign with the Navy during the world war, he returned to Alcoa in December, 1918, as

John O. Chesley

mechanical engineer in the sales department. He served as commodity manager in charge of sheet, rod, wire, bar, tubing, and jobbing from 1922 to 1927, and organized and headed the sales development division in June, 1927.

◆

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.—*Harry H. Chapman*, manager of the Minneapolis, Minn., office of the Westinghouse Electric & Manufacturing Co. has been appointed manager of the Transportation department with headquarters at East Pittsburgh, Pa., following a reorganization of the Central Station and Transportation department in which the

Harry H. Chapman

latter was established as a separate industry department. Mr. Chapman was born in St. Louis, Mo., and was a graduate of the University of Illinois in 1919. Shortly after graduation, he entered the employ of Westinghouse as chief clerk in the power and railway division, with headquarters in Chicago. Later he was employed in various sales capacities in the company's northwestern district until August, 1936, when he was named manager of the Minneapolis office.

DEARBORN CHEMICAL COMPANY.—*Robert F. Carr*, president of the Dearborn Chemical Company for the last 49 years, has been elected to fill the newly created position of chairman of the board. *George R. Carr*, vice-president and general manager, has been elected chairman of the executive committee, and *Robert Adams Carr*, vice-president has been elected president. *S. C.*

Robert F. Carr

Johnson, assistant vice-president of the Eastern division, has been elected vice-president in charge of the railroad department of the Eastern division. *Roger Q. Milnes*, assistant vice-president of the Western division has been elected vice-president in

George R. Carr

charge of the railroad department of the Western division, and *A. H. Reynolds*, chief chemist, has been appointed directing chemist.

Robert F., Carr, chairman of the board, was born at Argenta, Ill., on November 21, 1871, and was a graduate of the University of Illinois in 1893. In 1894 he entered the employ of the Dearborn Chemical Company and served successively as secretary and vice-president and general manager until 1907 when he was elected president. During World War I, Mr. Carr served as major on the general staff of the U. S. Purchase, Storage, and Traffic division.

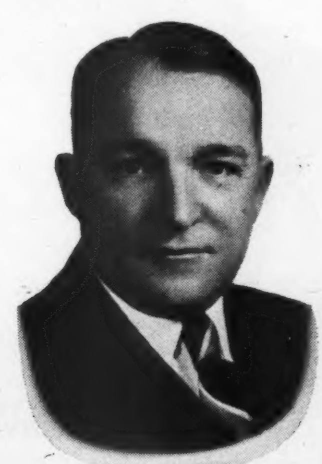
George R. Carr, the newly elected chairman of the executive committee, was born in Argenta, Ill., on January 23, 1877, and was a graduate of the University of Illinois in 1901. Two weeks after graduation he became associated with Dearborn as a salesman and served successively until 1922 as assistant general manager and general manager. In 1922 he was elected vice-president and general manager. Mr. Carr is also chairman of the board of the Locomotive Firebox Company.

Robert Adams Carr, who has been elected president of Dearborn, was born in Oak Park, Ill., on September 21, 1903, and was a graduate of the University of Chicago in 1926. He entered railway service in the

Robert Adams Carr

mechanical department of the Southern Pacific in 1927 and a year later entered the employ of the Locomotive Firebox Company where he engaged in sales and production work. In 1934, he was appointed managing director of Dearborn, with headquarters at Buenos Aires, Argentina. In 1937, he was elected vice-president of the railroad department.

S. C. Johnson, who has been elected vice-president in charge of the railroad depart-



S. C. Johnson

ment of the Eastern division, was a graduate of the University of Kansas in 1921. Immediately after graduation he was appointed assistant bacteriologist in the water laboratory of the Kansas State Board of

(*Continued on second left-hand page*)

TRIPLE
GENERAL MOTORS
DIESEL
SERVICE
Tools of Peace-Mighty
ATLANTIC COAST LINE
603
ATLANTIC COAST LINE

MOTIVE power of the Atlantic Coast Line has been materially strengthened by the recent addition of four General Motors 5400 Hp. Diesel Freight Locomotives, with more to follow. These locomotives combine speed for faster schedules, power for greater tonnage capacity, adaptability to varying operating conditions, high availability with fewer stops for fuel, water and servicing. Sturdy, efficient and dependable, GM Freight Diesels have what it takes to meet the exacting transportation demands of war and peace.

Having already definitely proved the superior service and operating economies of GM Diesel Switchers and Passenger Locomotives, the Atlantic Coast Line now joins the fast growing group of railroads using GM Diesel *Triple Service* — Freight — Passenger — Switcher.

★ ***LET'S ALL BACK THE ATTACK — BUY MORE WAR BONDS*** ★

Atlantic Coast Line
Virginia - North Carolina - South Carolina - Alabama - Florida - Georgia

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION LA GRANGE, ILLINOIS, U. S. A.

Health. He entered railroad service on January 1, 1923, as a chemist in the Water Service department of the Southern district of the Missouri Pacific, with headquarters at Little Rock, Ark. In July, 1924, he resigned to become chief chemist in the water supply department of the Chesapeake & Ohio, with headquarters at Huntington, W. Va. He entered the employ of Dearborn on January 1, 1930, and has held successive positions in the railroad department as chemical engineer and assistant vice-president.

Roger Q. Milnes, who has been elected vice-president in charge of the railroad department of the Western division of the Dearborn Chemical Company, entered railroad service in the car department of the Chicago, Burlington & Quincy at Hannibal, Mo. Later he was employed by the Northern Pacific at Spokane, Wash., as a fire-

Roger Q. Milnes

man and still later as a fireman on the Cripple Creek Short Line. In 1910, he entered the service of the Atchison, Topeka & Santa Fe as a fireman and in 1914 became an engineman. In 1924 he became superintendent of fuel and road foreman of the Florida East Coast. In 1927 he joined the staff of Dearborn as service engineer. Mr. Milnes was appointed assistant vice-president of the railroad department in 1936.

◆

American Chain & Cable Company.—The American Chain & Cable Co., Bridgeport, Conn., has acquired the Maryland Bolt & Nut Co., of Baltimore, Md., manufacturers of a line of bolts, nuts, lag screws and forgings. Operations will be continued at the Baltimore plant as heretofore.

◆

Brake Equipment & Supply Company.—*J. G. Alperson,* executive vice-president of the Brake Equipment & Supply Co., has been elected president to succeed *B. Pratt,* who becomes chairman of the board. *C. J. Smith* has been elected vice-president and *John H. McCartney,* manager of sales, has been elected a director and vice-president.

◆

Graybar Electric Company.—*John E. Fontaine* has been appointed manager of the Beaumont, Tex., office of the Graybar Electric Company to succeed *J. P. O'Neill,* who died recently after 27 years of continuous service with the company.

American Car and Foundry Company.—*W. F. Dietrichson,* assistant general mechanical engineer at Berwick, Pa., has been appointed general mechanical engineer of the American Car and Foundry Company with headquarters at Berwick. In the January issue it was incorrectly stated that Mr. Dietrichson had been appointed mechanical engineer. *Thomas F. Wilson* has been appointed assistant to the senior vice-president. *E. J. Finkbeiner,* who has served in the operating department of the company since May, 1922, and *J. L. Wood,* mechanical engineer, have been appointed assistant vice-presidents.

Thomas F. Wilson began his career with the New York Central in March, 1906, and continued with that road until 1916. He joined the American Car and Foundry Company in June, 1916, as secretary to W. C. Dickerman, now chairman of the board of the American Locomotive Company. Following service as an ensign in the Navy during 1918-19, he returned to the American Car and Foundry Company and was subsequently appointed secretary to the senior vice-president in charge of operations.

E. J. Finkbeiner has been associated with the company for almost forty years. He joined the American Car and Foundry Company as a clerk in the auditing department of the Detroit, Mich., plant in July, 1904, and served in the production division there during the first world war. He was transferred to the New York office in May, 1922, as general supervisor of costs and estimates.

J. L. Wood is a graduate in engineering of Alabama Polytechnic. During summer vacation periods, he worked in the Whistler Shops of the Mobile & Ohio and in the

J. L. Wood

drafting room of the Gulf, Mobile & Northern. He became local engineer at the Memphis, Tenn., plant of the American Car and Foundry Company in January, 1906; assistant mechanical engineer in the engineering department at New York in January 1928, and mechanical engineer in December, 1936.

◆

American Locomotive Company.—*Henry Schreck* has been appointed consulting engineer, Diesel engine division of the American Locomotive Company. In 1914 Mr. Schreck became assistant chief engineer and in 1916 chief engineer of the Fulton Iron Works. He became associated with the Ingersoll-Rand Company as de-

Henry Schreck

signing engineer in 1918 and served as works manager and chief engineer at the Lombard Governor Company from 1920 to 1922. He was head designing engineer of the Combustion Utilities Company in New York from 1922 to 1927, and became designing engineer of the Rathborn-Jones Engineering Company in Toledo, Ohio, in 1928. He served as division engineer of Fairbanks, Morse & Co. in Beloit, Wis., from 1929-30, and was consulting and designing engineer of the Ingersoll-Rand Company in Painted Post, N. Y., from 1931 to 1936. Since 1936, Mr. Schreck had been consulting and designing engineer of Fairbanks, Morse & Co.

◆

SKF Industries, Inc.—*Walter C. Ahlers,* assistant district manager of the Detroit, Mich., office of SKF Industries, Inc., has been appointed Detroit district manager to succeed *Robert H. Hirsch,* who has resigned.

◆

Lincoln Electric Company.—*R. H. Davies* has been appointed welding engineer representative in Washington, D. C., for the Lincoln Electric Company. Mr. Davies had been associated with Henry J. Kaiser as first plant engineer in the building of several plants at Permanente, Calif. After the construction period he was appointed superintendent and was also in charge of production and plant development.

◆

Timken Roller Bearing Company.—*H. B. Lilley,* formerly assistant chief inspector engineer, has been appointed sales development engineer of the steel and tube division of the Timken Roller Bearing Co.

Army-Navy "E" Awards

Babcock & Wilcox Co., Augusta, Ga. Second star.

J. G. Brill Company, Philadelphia, Pa.

Cochrane Corporation, Philadelphia, Pa.

H. K. Porter Company, Pittsburgh, Pa. Star.

FIRTH-STERLING STEEL COMPANY.—*Bennett S. Chapple, Jr.*, assistant manager of sales, New York district, of the Carnegie-Illinois Steel Corporation, has been appointed assistant to the president of the Firth-Sterling Steel Company, McKeesport, Pa.

◆

ALLEGHENY-LUDLUM STEEL CORPORATION.—*H. N. Arbuthnot,* assistant general manager of sales of the Allegheny-Ludlum Steel Corporation at Brackenridge, Pa., has been appointed regional manager of the Detroit (Mich.) region of the corporation, a new position created as the result of the consolidation of manufacturing and distribution facilities in the Detroit district. Mr. Arbuthnot was graduated from Washington and Jefferson University in 1914 and shortly thereafter entered the employ of the American Sheet & Tin Plate Co. Later he went with the Weirton Steel Company and was advanced to assistant district manager of its Chicago office. Still later he became associated with the Follansbee Brothers Company, serving first as district manager and later as special representative at Detroit. In 1926, he was appointed Detroit district manager of Allegheny and later became assistant general manager of sales.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Thomas P. Gorter,* assistant vice-president of the Pullman-Standard Car Manufacturing Company, Chicago, in charge of the company's Washington, D. C., car sales office, has been elected vice-president. *R. J. Golden* has been appointed assistant to the vice-president

Thomas P. Gorter was born in Baltimore, Md., and was educated at Princeton University. He left school in 1917 to enlist in the Army and upon his discharge in 1919, entered the sales department of the Haskell & Barker Company, Michigan City, Ind., (now part of Pullman-Standard). In 1923 he was transferred to Pullman-Standard's New York sales office and in 1928 to its Washington, D. C., office. In 1942 he became assistant vice-president.

AMERICAN STEEL & WIRE COMPANY.—*W. E. Mackley,* manager of sales of the Buffalo, N. Y., office of the American Steel & Wire Company, subsidiary of the United States Steel Corporation, has been appointed manager of the manufacturers sales department of the New York office. *F. E. Ward,* assistant manager of the manufacturers sales department in New York, has been appointed manager of sales at Buffalo, to succeed Mr. Mackley, and *F. L. Nonnenmacher* has been appointed assistant manager in New York to succeed Mr. Ward.

◆

KROPP FORGE COMPANY.—*H. M. Comstock,* assistant to the president of the Clearing Machine Corporation, has been appointed engineering sales representative of the Kropp Forge Company in the southern California territory. Mr. Comstock served a year in Washington with the tools division of the War Production Board as chief of the forge and press section.

◆

LUKENS STEEL COMPANY.—*L. P. McAllister,* metallurgical engineer of the Lukens Steel Company since 1936, has been appointed assistant to the general superintendent, and *Joseph G. Althouse,* engineer of tests, has been appointed metallurgical engineer. *William Taylor,* assistant engineer of tests, succeeds Mr. Althouse.

◆

WESTINGHOUSE AIR BRAKE COMPANY.—*S. L. Poorman,* eastern manager of the Westinghouse Air Brake Company, has been appointed assistant to the first vice-president, with headquarters at the company's general office in Wilmerding, Pa., and *S. L. Williams,* assistant manager for the eastern district, has been appointed manager to succeed Mr. Poorman.

Obituary

ROBERT W. THOMAS, treasurer and a director of the Thomas Machine Manufacturing Company, Pittsburgh, Pa., died on February 6. Mr. Thomas was 40 years of age. He had entered the Thomas Machine Manufacturing Company, which was founded by his father, following his graduation from the University of Pittsburgh in 1926.

◆

LAWRENCE H. DUNHAM, assistant manager of the metallurgical department of the American Steel & Wire Co., died in Pittsburgh, Pa., on January 19. He was 52 years of age.

◆

DAMON DE BLOIS WACK, executive vice-president of the National Bearing Metals Corporation, a subsidiary of the American Brake Shoe Company, died in St. Louis Mo., on February 1. Mr. Wack was 36 years of age. He was a graduate of Yale University in 1929. He entered the American Brake Shoe Company in 1934, and was

D. deB. Wack

appointed vice-president of the company's Pacific coast division in 1939. He was transferred to the National Bearing Metals Corporation at St. Louis in October, 1941, and was elected executive vice-president in 1942.

Personal Mention

General

J. F. SMITH, superintendent of motive power and car equipment, Northern Ontario district, of the Canadian National at North Bay, Ont., has retired.

W. S. DAVIS has been appointed superintendent of motive power and car equipment, Northern Ontario district, of the Canadian National, with headquarters at North Bay, Ont.

T. J. LYON has been appointed assistant general superintendent of motive power of the New York Central, with headquarters at New York.

R. W. RETTERER, assistant superintendent of equipment of the Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind., has been appointed superintendent of equipment, with headquarters at Indianapolis.

GEORGE W. BIRK, assistant to the superintendent of motive power and rolling stock of the New York Central at New York, has been appointed assistant superintendent of equipment of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, Ind.

FRED K. MURPHY, superintendent of equipment of the Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind., has retired after 51 years' service. Mr. Murphy was born at Kokomo, Ind., on January 3, 1874, and entered railway service on March 25, 1892, as a machinist apprentice in the employ of the Big Four at Indianapolis. In May, 1898, he went with the Illinois Central as a machinist and a short time later was promoted to foreman, with headquarters at Paducah, Ky. One year later, Mr. Murphy became a machinist foreman on the Detroit Southern (street railway), with headquarters at Springfield, Ohio. In July, 1901, he returned to the Big Four as a machinist at Bellefontaine, Ohio, and in 1906 became air-brake instructor at Indianapolis. He subsequently served as air-brake supervisor, master mechanic and assistant superintendent of motive power, with headquarters at Indianapolis; on July 1, 1936, was appointed assistant superintendent of equipment, and on January 1, 1938, became superintendent of equipment.

WARREN ROBERT ELSEY, assistant to vice-president of the Pennsylvania, has been appointed assistant vice-president in charge of real estate, purchase and insurance. Mr. Elsey, who was born at Pittsburgh, Pa., on April 1, 1892, was a graduate of the Carnegie Institute of Technology in 1910. He entered railroad service in September, 1911, as a draftsman in the employ of the Penn-

(Continued on second left-hand page)

4-8-8-4

Locomotive Characteristics

Weight on Drivers	540,000 Lb.
Weight of Engine	762,000 Lb.
Cylinders (Four)	23¾ x 32 Ins.
Diameter of Drivers	68 Ins.
Boiler Pressure	300 Lb.
Tractive Power	135,375 Lb.
Tender Capacity—Fuel	28 Tons
Tender Capacity—Water	24,000 Gals.

1ST BUILT IN 1941

20 DELIVERED

5 MORE UNDER ORDER

4-6-6-4

Locomotive Characteristics

Weight on Drivers	404,000 Lb.
Weight of Engine	627,000 Lb.
Cylinders (Four)	21 x 32 Ins.
Diameter of Drivers	69 Ins.
Boiler Pressure	280 Lb.
Tractive Power	97,350 Lb.
Tender Capacity—Fuel	28 Tons
Tender Capacity—Water	25,000 Gals.

1ST BUILT IN 1936

85 DELIVERED

20 MORE UNDER ORDER

4-8-4

Locomotive Characteristics

Weight on Drivers	270,000 Lb.
Weight of Engine	483,000 Lb.
Cylinders	25 x 32 Ins.
Diameter of Drivers	80 Ins.
Boiler Pressure	300 Lb.
Tractive Power	63,800 Lb.
Tender Capacity—Fuel	25 Tons
Tender Capacity—Water	23,500 Gals.

1ST BUILT IN 1937

35 DELIVERED

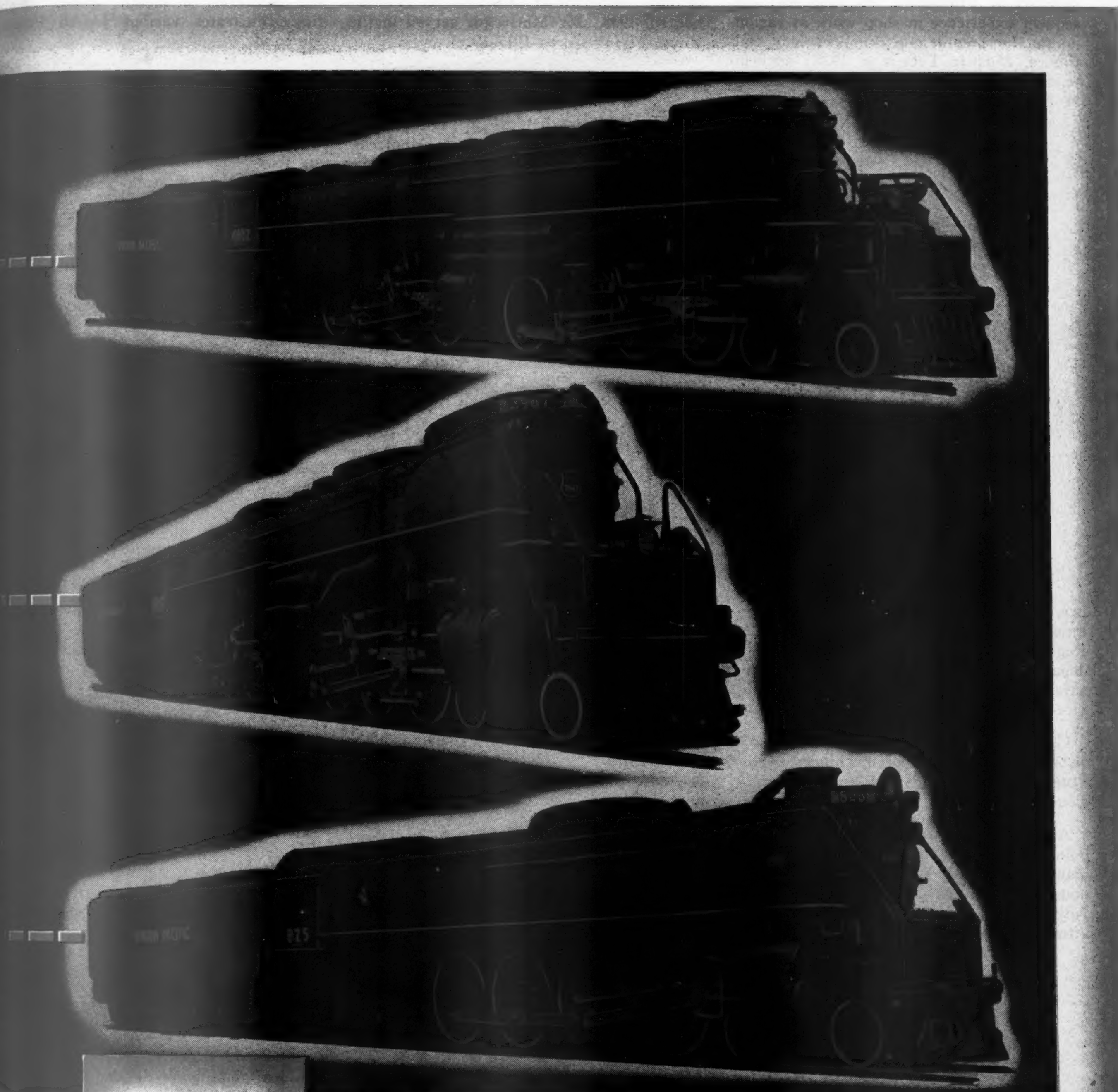
10 MORE UNDER ORDER

175

BUY WAR BONDS

Alco

AMERICAN LOCOMOTIVE



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sylvania at Pittsburgh, Pa., and had subsequent experience in shop work at various points. He became master mechanic at Baltimore, Md., in February, 1928; superintendent of floating equipment at New York in 1929 and mechanical engineer in October, 1936. He was appointed general superintendent of motive power of the Eastern Region in 1941, and was transferred to the department of real estate, purchases and insurance in July, 1942, as assistant to the vice-president.


Warren Robert Elsey

C. W. Mathews has been appointed assistant superintendent of machinery of the Louisville & Nashville with headquarters at Louisville, Ky.

Adam McGregor, who has been appointed mechanical inspector of the Canadian National at Montreal, Que., as announced in the February issue, was born on July 13, 1897, at Kilmarnock, Scotland. He attended Kilmarnock Academy (1903-1912) and the Royal Technical College, Glasgow (1916-1920). He entered railroad service on November 16, 1921, as a laborer on the Canadian National. He became a carman in July, 1922; layout man in June, 1923; draftsman in July, 1925; engine inspector in October, 1940; mechanical inspector at Winnipeg, Man., in March, 1941, and mechanical inspector at Montreal on November 10, 1943. Mr McGregor served in the Royal Flying Corps 1917-19.


A. McGregor

Car Department

J. Brooks, mechanical inspector (car) of the Canadian National at Montreal, Que., has retired under pension regulations.

A. N. Campbell, assistant foreman of the coach yard of the Canadian National at Toronto, Ont., has been appointed mechanical inspector (car), with headquarters at Montreal, Que.

Shop and Enginehouse

K. D. Read, assistant superintendent locomotive shops of the Cleveland, Cincinnati, Chicago & St. Louis at Beech Grove, Ind., has been appointed assistant superintendent of the New York Central shops at West Albany, N. Y.

Purchasing and Stores

E. I. Fries, general purchasing agent of the Union Pacific at Omaha, Neb., has retired after 56 years' service.

A. C. Card, assistant to the general purchasing agent of the Union Pacific at Omaha, Neb., has been appointed assistant general purchasing agent, with headquarters at Omaha.

G. T. Wickstrom, assistant general purchasing agent of the Union Pacific, with headquarters at Omaha, Neb., has been appointed general purchasing agent, with headquarters at Omaha.

T. J. Ruth, acting purchasing agent of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn., has been promoted to purchasing agent, with the same headquarters.

Obituary

D. P. Carey, assistant general mechanical superintendent of the New York, New Haven & Hartford at New Haven, Conn., died on February 5.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

Jacks. — Duff-Norton Manufacturing Company, Pittsburgh, Pa. Catalog 202. Contains descriptions, specifications and illustrations of the various types of jacks and sizes in the Duff-Norton line.

◆

Band Filing Machine. — Continental Machines, Inc., 1301 Washington avenue South, Minneapolis 4, Minn. Four-page bulletin. Contains information on file broaching operations on metals, wood, and plastics. Illustrates various DoAll Precision file bands.

◆

Cutting Tools.—U. S. Tool & Mfg. Co., 6906 Kingsley, Dearborn, Mich. Spiral-bound catalog, 1943 edition, with blank blue-print forms on milling cutters; forming tools; end mills, reamers, counterbores for use when requesting quotations.

◆

Milling, Broaching, Grinding Machines.—Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio. General catalogue (M-99502). Machines for milling, broaching, grinding, lapping, cutter sharpening.

◆

Straightening and Bending Presses. —Watson-Stillman Company, Roselle, N.J. Bulletin No. 320-A. Thirty-eight pages of description, illustrations, and tables of work capacities of the Watson-Stillman line of straightening and bending presses.

◆

Stellite Tools.—Haynes Stellite Company, Kokomo, Ind. Eight-page booklet, Form 5350, "Operating Information on Stellite 98M2 Cobalt-Chromium-Tungsten Turning and Boring Tools and Milling Cutters." Illustrated with drawings, photographs and charts.

◆

Manganese Steel for the Railroad Industry.—American Brake Shoe Company, American Manganese Steel Division, Chicago Heights, Ill. Thirty-two-page Bulletin 943-R. Discusses manganese steel and its properties and describes and illustrates its use for car and locomotive wearing parts. Special sections on track work, etc.

◆

Gisholt Machines.—Gisholt Machine Company, Madison, Wis. Three-color, 32-page catalog of Gisholt line of turret lathes, automatic lathes and balancing machines. Brief descriptions and principal specification data accompany the illustrations of the various types and sizes of tools.

◆

Machine Tools.—W. F. and John Barnes Co., Rockford, Ill. Fifty-page loose-leaf data book divided into six sections: I—Multiple Drilling and Reaming Machines; II—Boring and Facing Machines; III—Milling Machines; IV—Deep Hole Machines; V—Miscellaneous Machines; VI—Data Sheets.

◆

Railroad Pins and Bushings.—Ex-Cell-O Corporation, Detroit, Mich. Eight-page catalogue lists standard sizes in Ex-Cell-O hardened and ground steel pins and bushings for locomotive driver brake and spring rigging and for car and tender-truck brake rigging.

◆

Electric Industrial Trucks.—Yale & Towne Manufacturing Company, Philadelphia division, Philadelphia, Pa. Seventy-six-page War Model catalogue. Describes Yale & Towne trucks in detail and illustrates many uses of industrial power trucks. Separate section devoted to WPB Limitation Order No. L 112 as applied to Yale industrial trucks.

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- Welding
- Cable Connectors
- Couplers
- Watertight Plugs and Receptacles
- Turntables
- Industrial Trucks

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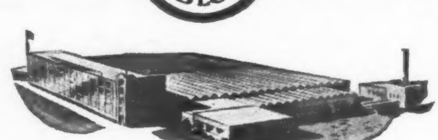
YOUR NAME ______ TITLE ______

YOUR FIRM ______ ADDRESS ______



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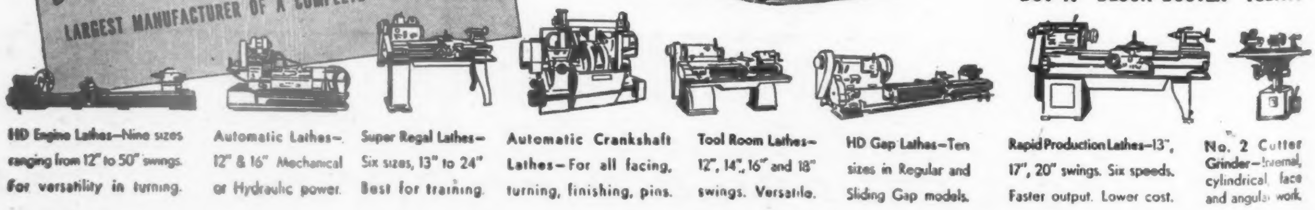

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